

# **Standard Operating Procedure for Phytoplankton Analysis**

**LG401**

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## Standard Operating Procedure for Phytoplankton Analysis

### **1.0 SCOPE AND APPLICATION**

- 1.1 This method, as first described by Utermohl (1958), is utilized to identify and enumerate the phytoplankton community from many different types of aquatic habitats.

### **2.0 SUMMARY OF METHOD**

- 2.1 The method, called the Modified Utermohl method, involves the microscopic examination of a preserved water sample. Initially a preliminary scan is made to determine the volume of sample needed for other portions of the procedure. A settled sample of appropriate volume is then examined for non-diatom algae and *Urosolenia* species (hereafter referred to as 'soft algae'). A second examination is performed on a cleaned diatom preparation for identification and enumeration.

### **3.0 SAMPLE COLLECTION AND PRESERVATION**

- 3.1 See United States Environmental Protection Agency Standard Operation Procedure For Phytoplankton Collection and Preservation.
- 3.2 A composite (integrated) sample is prepared from the upper region of the water column. For an unstratified water column, the integrated sample is prepared by taking equal volumes of water from SRF (1 m), 5 m, 10 m and 20 meters unless the depth is less than 20 meters. If the total depth is between 15 and 22 meters, the 20 meter sample is replaced by the bottom sample (B-1 or B-2). If the total depth is less than 15 meters, equal volumes are taken from surface, mid-depth, and bottom sample (B-1 or B-2).

For a stratified water column, equal volumes are taken from the surface, 5 m, 10 m, and lower epilimnion (LEP). If the epilimnion is very shallow, equal volumes are taken from a maximum of four sampling depths and a minimum of two sampling depths. The underlying strategy is to collect a representative sample from the epilimnion.

### **4.0 APPARATUS**

- 4.1 Inverted microscope with an objective system for magnification up to 600x (Leitz Diavert or another equal quality inverted microscope)
- 4.2 Compound microscope with an objective system of magnification up to 1400x
- 4.3 Sedimentation chambers: 5-, 10-, 25-, 50- and 100-cc
- 4.4 Beakers: 300- and 600-mL
- 4.5 Hotplate
- 4.6 Centrifuge
- 4.7 Centrifuge tubes, graduated 15-mL
- 4.8 Cover slips, round, #1 thickness, 22-mm diameter

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- 4.9 Pre-cleaned microscope slides, 25 x 75 mm
- 4.10 Syringe, 20-mL with cannula, 14-gauge 4-inch
- 4.11 Long-neck disposable pipettes
- 4.12 Rubber bulbs for pipettes
- 4.13 10-mL autopipette

## **5.0 REAGENTS**

- 5.1 HNO<sub>3</sub> = Nitric Acid (concentrated)
- 5.2 H<sub>2</sub>O<sub>2</sub> = Hydrogen peroxide (30% solution)
- 5.3 K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> = Potassium dichromate
- 5.4 Hyrax<sup>TM</sup> mounting media, or equivalent
- 5.5 Toluene/xylene
- 5.6 Commercial formaldehyde solution 37 - 40% (= Formalin)
- 5.7 "Leitz" immersion oil

## **6.0 ANALYTICAL PROCEDURE**

- 6.1 Phytoplankton sample received at the lab shall be logged-in and spiked with 10 ml of Formalin.
- 6.2 10-mL Preliminary Investigation
  - 6.2.1 An initial screening of each sample must be done in order to determine the final settled volume needed for analyses unless historical data is available to show what volumes have traditionally been used for samples from the same site. This is done by sedimenting 10 mL of each sample and counting the total number of photosynthetic organisms, and the number of diatom cells, within a select area of the slide (10 mm<sup>2</sup> minimum or 3 transects of the chamber). No identifications are done at this time, but any irregularities such as excessive sediment in the sample are noted.

The volume needed for settling and subsequent soft algae analysis is determined from the number of all organisms counted. The sample volume to be digested for diatom analysis is determined from the preliminary diatom cell counts. However, the minimum volume for digestion is recommended to be 500 mL. For example:

### 10-mL preliminary counts

- 1) 101 organisms total
- 2) 103 diatom cells (note: 1 cell has 2 frustules/valves)

Count needed (minimum)

- 1) 250 organisms total
- 2) 500 diatom frustules (250 cells)

Final volumes

- 1) 25-mL sample for sedimentation
- 2) 500-mL sample for digestion

The final volume may be slightly over-estimated to ensure that the minimum counts required are met. The preliminary count also helps to ensure that there is enough sample for both final investigations.

The definition of an organism is as follows:

A colony, a filament, or a single cell. The units of a colony or a filament are not counted as organisms at this time but the whole aggregate is counted as one organism.

- 6.2.2 All information from the 10-mL preliminary count is recorded in a pre-printed data form. This includes unusual observations such as poor sample preservation, high bacterial/fungal populations, occurrence of special/rare phytoplankton taxa, and the degree of matrix interference, etc.

### 6.3 Sample Sedimentation

- 6.3.1 The phytoplankton sample is homogenized by gently inverting the sample bottle for 60 seconds. The predetermined sample volume is loaded into a settling Utermohl chamber of appropriate volume. Samples should be added to the chamber with a syringe and/or macropipettor. The sample bottle should be inverted at least once between each addition. This is done because larger organisms settle quickly and may remain in the bottle if the sample is simply poured. The chamber is topped with a round top plate.
- 6.3.2 Algae are allowed to settle onto the base of the settling chamber. Since oil immersion may be used in the course of identification, the coverglass at the bottom of the chamber should not be thicker than 0.2 - 0.3 mm inches (or No. 1 coverglass). The time recommended for complete sedimentation varies with the height of the chamber (8 cm/day to 4 cm/day depending on accuracy required in enumeration (Furet & Benson-Evans, 1982)).

- 6.3.3 Approximate settling times necessary are as follow:

100 mL -----	100 hours
50 mL -----	50 hours
25 mL -----	25 hours
10 mL -----	10 hours
5 mL -----	5 hours
2 mL -----	2 hours

### 6.4 Total Sample Analysis

- 6.4.1 A complete phytoplankton analysis consists of two parts. The first part is a count of all organisms in the settled sample at 500x. The second part is a count made on a prepared diatom slide at 1250x.

### 6.5 Sedimented Sample Analysis

- 6.5.1 The soft algae portion of the settled phytoplankton samples are examined and analyzed using an inverted microscope (Leitz Diavert or equivalent microscope).
- 6.5.2 All "live" forms (chloroplast containing organisms) are counted and identified at 500x. Higher magnification may be used for identification when necessary.
- 6.5.3 Procedure
  - 6.5.3.1 The entire chamber of settled material is scanned and the dominant (4 or 5 most common organisms) as well as subdominant species determined. This is to give the biologist an idea of the sample composition as well as to insure that the sample is evenly settled.
  - 6.5.3.2 A minimum of ed 3 strips is required, including a minimum of 250 "live" organisms. If 250 organisms are not observed within three strips, identification and enumeration are continued in strips until at least 250 are counted. The area counted is recorded since it is needed for cells per mL calculation.
  - 6.5.3.3 For the purposes of determining the numbers of organisms to count, colonies and filaments are considered one organism. However, for the purposes of calculating biovolume, individual cells within colonies and filaments are counted and measured. Where numbers of cells cannot be counted, e.g., in extremely large cyanobacterial colonies, estimates can be made.
  - 6.5.3.4 Large organisms, such as *Ceratium hirundinella*, should be enumerated from the whole chamber. Calculations of cell numbers of such organisms should be done using the area of the entire chamber bottom.
  - 6.5.3.5 The number of "live" cells are enumerated at the lowest taxonomic unit possible (i.e., genus, species, variety, etc.). All "emptied" lorica from Chrysophyta are also enumerated and identified to species level where possible, although these are not included in the 'regular' cell counts.
  - 6.5.3.6 At least 20 specimens of each species are measured for cell volume calculations. When fewer than 20 specimens are present, those present are measured as they occur. The measurements required are those which are necessary for the volume calculation of a solid which best approximates the shape of any particular organism. For most organisms the measurements are taken from out-side wall to outside wall.
  - 6.5.3.7 Those forms which are lorate (Chlorophyta: Phacotaceae and Chlorococaceae; Chrysophyta: many forms) must have the active portion, i.e., protoplast measured. Filamentous and colonial forms require measurements of the individual components. If cell walls are not readily visible in the filament, the length of the entire colony is measured and the number of cells is determined by dividing by the average cell length which is measured when possible.
  - 6.5.3.8 During examination of the settled sample, most diatoms are enumerated and identified only as live pennates, empty pennates, live centrics, and empty centrics, with the only exception being species of *Urosolenia* (=*Rhizosolenia*). Actual species identification of diatoms (excluding *Urosolenia*) and cell volume measurements are done under oil immersion (1250x) by another method. While not included in the regular counts, note should be made of the presence of other identifiable species, such as *Fragilaria capucina*, *Fragilaria crotonensis*, *Tabellaria flocculosa*, and *Stephanodiscus binderanus*, to provide corroboration of identifications in cases where colonial configuration is a characteristic feature.

## 6.6 Diatom Sample Analysis

- 6.6.1 The cellular contents of diatoms obscures the wall markings on which the taxonomy is based. Therefore, the organic matter must be removed (oxidized) prior to identification. The following method describes a cleaning method, slide preparation, enumeration, as well as identification.

### 6.6.2 Cleaning of Diatoms

The cleaning steps in Sections 6.5.1.1 to 6.5.1.3 must be performed in the hood.

6.6.2.1 Homogenize the sample by gently inverting the sample bottle every second for a minimum of one minute. Pour a specified volume (dependent upon diatom density and determined by the initial 10-mL count discussed previously) of homogenized sample is put into a 600-mL (or larger) beaker. Unless diatom densities are extremely high, a minimum volume of 500 mL should be used.

6.6.2.2 Add 20 mL of concentrated HNO<sub>3</sub> to the beaker. Then place the beaker on a hotplate and heat until volume is reduced to about 20 mL.

6.6.2.3 Pour the remaining 20 mL of sample into a 300-mL beaker. Completely rinse the sides of the beaker with RO/DI or distilled water at least three times and empty this rinse water into the beaker. If necessary, repeat this process several times until a volume of 125 mL is reached. Put 25 mL 30% H<sub>2</sub>O<sub>2</sub> into the beaker, and a few grains of crystal K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>. Place sample on hotplate again and heat until volume is reduced to less than 10 mL.

6.6.2.4 After sample is reduced to 5-10 mL, transfer the sample into a 15-mL graduated centrifuge tube. Rinse the beaker at least three times with small quantities of distilled water and add rinse water to the tube to ensure all frustules are transferred to the centrifuge tube. All centrifuge tubes should contain the same volume to ensure centrifuge is balanced. Centrifuge at low speed (1500 rpm) for 20 to 30 minutes. Alternatively, samples can be concentrated by settling in glass test tubes or vials.

6.6.2.5 Draw off all but 0.5 mL of supernatant, ensuring that the pellet is not disturbed. Add distilled water, gently shake the sample using a vortex mixer, and centrifuge again for 20 to 30 minutes at low speed. Repeat this step 10 times.

6.6.2.6 Upon final centrifugation draw off all but 0.5 mL of supernatant. Bring volume up to approximately 5 mL with RO/DI or distilled water. This is the “cleaned” sample to be used to prepare diatom slide for analysis.

### 6.6.3 Diatom Slide Preparation

6.6.3.1 Where possible, 2 slides should be made from each sample. The second slide should be marked “duplicate.”

6.6.3.2 Place a clean coverslip (thickness: No. 1; size 22 mm, circular) on a slide warmer (150 - 200°F).

6.6.3.3 Gently homogenize the pellet and pipette about 0.25 mL of the concentrated sample on the center of a coverslip and let dry. A larger or smaller aliquot may be used depending on the diatom densities. Observe under a compound microscope to be sure that there is an adequate density of

frustules to allow counting. If there is not a sufficient density for counting, increase frustule density by adding more sample.

- 6.6.3.4 Add a drop of Hyrax mounting medium to the center of a clean pre-labeled slide (75 x 25 mm). If the Hyrax mounting medium is too viscous, add a few drops (1 to 2 mL) of toluene and/or xylene to dilute the medium.
- 6.6.3.5 Mount the coverslip, diatom side down, on the slide and place on hotplate.
- 6.6.3.6 Allow solvent to evaporate until bubbles are no longer formed under the coverslip. Remove from hotplate.
- 6.6.3.7 Press coverslip gently with pencil eraser to extrude excess Hyrax immediately after removing from heat, as the medium sets up very quickly.
- 6.6.3.8 Allow slide to cool and remove excess Hyrax before examining. It will scrape away easily with a razor blade if all of the solvent is removed: if it is sticky, return to the hotplate to remove any remaining solvent.
- 6.6.3.9 Clean, label, and store the slide properly. The label should include the sample number, year, and station.

#### 6.6.4 Diatom Enumeration and Identification

- 6.6.4.1 Diatoms should be identified and enumerated at 1250x. Identification should be down to the lowest taxonomic rank possible.
- 6.6.4.2 Count at least 500 frustules (2 frustules = 1 diatom cell) per sample.
- 6.6.4.3 At least 10 specimens of each species are measured (wall to wall) for cell volume calculations. When fewer than 10 specimens are present, those present are measured as they occur. Measurements should be recorded as cell measurements, not frustule measurements. For example, when measuring the depth (i.e., length) of *Aulacoseira*, be sure to **either** measure two frustules together, **or** double the measurement of a single frustule. In some species, e.g. most *Stephanodiscus* and *Cyclotella*, depth measurements are problematic in that cells are seldom oriented in girdle view, and even when they are, total cell depth is not easily estimable from the depth of a single frustule due to overlap of the girdles. Care must therefore be taken in making these measurements.

#### 6.6.5 General Analysis Guidelines

- 6.6.5.1 Unknown species should be referred to as *Genus* spp. Taxa for which in-house descriptions exist, but descriptions have not been published, should be given the appropriate number (e.g., *Stephanodiscus* #10). It is crucial that these designations correspond only to previously established taxa. Numbered taxa appearing on the species list, but for which no descriptions have been found, are never to be used. If an analyst encounters a species that is not on the species list, it must be confirmed by an outside expert and approved by the Work Assignment Manager (WAM) before it is added to the species list. In the case of 'soft' algae, the organism should be photographed, a drawing should be made, making clear the distinguishing characteristics of the species, a written description provided, and reference made to the taxonomic work which contains the key/description that was used to identify the organism. For diatoms, in addition to

the above, the frustule should be marked on the slide, using, e.g., a diamond tipped etching tool. These materials should be sent to an appropriate expert for confirmation, and the results of confirmation, in addition to the original supporting materials, should be sent to the WAM, along with a brief memo describing the species and requesting inclusion in the species list. The WAM will then send a memo back, either approving or disapproving inclusion of the taxon on the species list.

## 7.0 ARCHIVING

### 7.1 Soft algae

- 7.1.1 Soft algae samples are to be archived one data set at a time.
- 7.1.2 Gently homogenize the remainder of the phytoplankton sample by inverting the bottle for about 1 minute. Carefully empty the sample into a 500-mL graduated cylinder and cover the cylinder with a plastic Petri plate. Record the volume of sample settled on a pre-printed phytoplankton archive form. A larger and/or smaller graduated cylinder may be used depending on the volume remaining in phytoplankton sample bottle.
- 7.1.3 Rinse the sample bottle three times with a small amount of RO/DI or distilled water (about 5 mL). Empty the rinse water into the graduated cylinder.
- 7.1.4 Settle the sample for a minimum of 7 days, but not more than 14 days. Do not disturb the cylinder.
- 7.1.5 At the end of the settling period, carefully siphon off the top of the water column without disturbing the settled materials. Generally, about 18 - 22 mL of the sample should be remaining in the cylinder.
- 7.1.6 Decant the remaining sample from the graduated cylinder into a pre-labeled 25-mL glass liquid scintillation vial. Rinse the cylinder two times with about 2 mL of RO/DI or distilled water and empty the rinse water into the vial. This is the archived sample.
- 7.1.7 Add about 0.5 mL of formalin solution into the vial before putting the cap on the vial.
- 7.1.8 To minimize evaporation, parafilm, or some other suitable substance, should be wrapped around the cap.
- 7.1.9 Store the archived sample in a pre-labeled tray/box.
- 7.1.10 Record the archived sample information into the computer.

### 7.2 Diatoms

- 7.2.1 After the diatom slides are made, transfer the remainder of "cleaned" sample to a pre-labeled glass vial.
- 7.2.2 Store the diatom archived sample in a box for future reference.

## **Sampling and Analytical Procedures for GLNPO's WQS**

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### **8.0 CALCULATIONS**

- 8.1 Report the results of the sample sedimentation procedure as cells per mL, which is calculated as follow:

$$\text{Cells/mL} = (C * TA) / (L * W * V * S)$$

where:

C	=	cell tally
L	=	length of strip (mm)
W	=	width of strip (mm)
V	=	volume of chamber (mL)
S	=	number of strips counted
TA	=	total area of chamber bottom ( $\text{mm}^2$ )

In the case of species (e.g., *Ceratium hirundinella*) for which the entire chamber bottom is examined, the formula reduces to:

$$\text{Cells/mL} = (C/V)$$

- 8.2 Biovolume is calculated using formulas representing the closest approximation of geometric shape. A list of geometric forms and the measurements required, are listed in the appendices.
- 8.3 The data from the diatom slides is reported as percent composition of the 1250x count. This percent is applied back to the live diatom counts at 500x to determine a cells/mL count for each species.
- 8.3.1 Calculate the total live centric (excluding *Urosolenia*) and live pinnate diatom cells/mL as per formula in 8.1.
- 8.3.2 For each diatom species encountered during the slide counts, calculate what percentage of the total number of centrics or pennates it represents by dividing the number observed by the total centric or pinnate diatom values enumerated.
- 8.3.3 Multiply this number by the appropriate number calculated in 8.3.1. This is the cells/mL for that species.

### **9.0 QUALITY CONTROL AUDITS AND METHOD PRECISION**

- 9.1 Ten percent of all samples collected are analyzed by a second analyst. At least 1 duplicate count is done per data set if the data set contains less than 10 samples. This includes identification, and tabulation of data.
- 9.1.1 Duplicate counts and measurements by two analysts should be done for both Utermohl samples and diatom slide counts.
- 9.1.2 Utermohl samples are counted by the second analyst while still in the counting chamber so that only interanalyst variation is quantified, and not variation associated with sub-sampling.
- 9.1.3 Results from the second analyst are reported under the same sample number as the original sample, with the exception that the seventh character is replaced by a "Q."
- 9.1.4 The Bray-Curtis Index is to be used as a quantitative method of species-level comparison for both enumerations and calculated biovolumes produced by the two analysts. The Bray-Curtis measure is calculated as follows:

$$PS_{jk} = 200 \frac{\sum_{i=1}^i (\min A_{ij} A_{ik})}{\sum_{i=1}^i A_{ij} + A_{ik}}$$

$$PS_{jk} = 200 \frac{\sum_{i=1}^i (\min A_{ij} A_{ik})}{\sum_{i=1}^i A_{ij} + A_{ik}}$$

where:

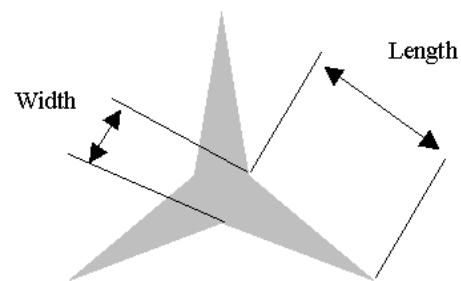
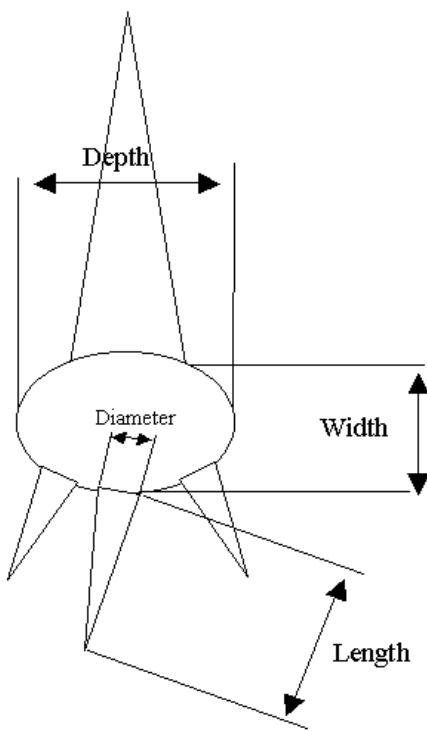
$PS_{jk}$  = percentage similarity between samples j and k,  
 $A_{ij}$  = abundance of taxon i in sample j, and  
 $A_{jk}$  = abundance of taxon i in sample k.

- 9.1.5 An interim minimum acceptance value of 60 is currently being used until enough data accumulate to determine a more appropriate value. The two taxonomists will discuss the results from all samples which fail to meet this criteria. If a major difference is found in how the two analysts have been identifying or measuring organisms, the last batch of samples that have been counted by the analyst under review will be recounted or measured.

**Appendix 1: Geometric Forms and the Measurements Required**

Shape	Dimensions Required				
	Code	Length	Width	Depth	Diameter
Ceratium	CER	L	W	DP	D
Cone	CON	L	W		
Crucigenia	CRU	L			
Cylinder	CYL	L	W	DP	D
Dumbell box	DBB	L	W	DP	
Dumbell	DBL	L	W	DP	
Diamond Box	DMB	L	W	DP	
Fusiform	FUS	L	W		
Ovoid box	OVB	L	W	DP	
Ovoid	OVO	L	W		
Rectangular box	RTB	L	W	DP	
Sphere	SPH				D
Staurastrum	STR	L	W		
<i>Tabellaria flocculosa</i> v. <i>geniculata</i>	TFG	L	W	DP	D
Teardrop	TRP	L	W		

**Figure 1: Image of Ceratium**



**Appendix 2: Shape Code for Each Taxa**

DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	ACASP	<i>Acanthosphaera</i> sp.	OVO	L	W			
CHL	ACASP1	<i>Acanthosphaera</i> sp. #1	OVO	L	W			
BAP	ACHAFFI	<i>Achnanthes affinis</i>	Grun.	DMB	L	W	DP	
BAP	ACHAMOE	<i>Achnanthes amoena</i>	Hust.	OVB	L	W	DP	
BAP	ACHBIAS	<i>Achnanthes bialettiana</i>	(Kutz.) Grun.	OVB	L	W	DP	
BAP	ACHBIOR	<i>Achnanthes bioreti</i>	Germ.	OVB	L	W	DP	
BAP	ACHBREV	<i>Achnanthes brevipes</i>	Ag.	OVB	L	W	DP	
BAP	ACHBREVI	<i>Achnanthes brevipes</i> var. <i>intermedia</i>	(Kutz.) Cl.	OVB	L	W	DP	
BAP	ACHCALC	<i>Achnanthes calcar</i>	Cl.	OVB	L	W	DP	
BAP	ACHCLEV	<i>Achnanthes clevei</i>	Grun.	DMB	L	W	DP	
BAP	ACHCLEVR	<i>Achnanthes clevei</i> var. <i>rostrata</i>	Hust.	DMB	L	W	DP	
BAP	ACHCONS	<i>Achnanthes conspicua</i>	A. Mayer	OVB	L	W	DP	
BAP	ACHDEFL	<i>Achnanthes deflexa</i>	Reim. in Patr. & Reim.	DMB	L	W	DP	
BAP	ACHDELI	<i>Achnanthes delicatula</i>	(Kutz.) Grun.	OVB	L	W	DP	
BAP	ACHDETH	<i>Achnanthes detha</i>	Hohn & Hellerm.	OVB	L	W	DP	
BAP	ACHDISP	<i>Achnanthes dispar</i>	Cl.	OVB	L	W	DP	
BAP	ACHDUTH	<i>Achnanthes duthii</i>	Screen.	OVB	L	W	DP	
BAP	ACHEXIG	<i>Achnanthes exigua</i>	Grun.	DMB	L	W	DP	
BAP	ACHEXIGC	<i>Achnanthes exigua</i> var. <i>constricta</i>	(Grun.) Hust.	DMB	L	W	DP	
BAP	ACHEXIGH	<i>Achnanthes exigua</i> var. <i>heterovalva</i>	Krass.	DMB	L	W	DP	
BAP	ACHEXIL	<i>Achnanthes exilis</i>	Kutz.	DMB	L	W	DP	
BAP	ACHFLEX	<i>Achnanthes flexella</i>	(Kutz.) Brun	DMB	L	W	DP	
BAP	ACHFLEXA	<i>Achnanthes flexella</i> var. <i>alpestris</i>	Brun	OVB	L	W	DP	
BAP	ACHHAUC	<i>Achnanthes hauckiana</i>	Grun.	OVB	L	W	DP	
BAP	ACHHAUCR	<i>Achnanthes hauckiana</i> var. <i>rostrata</i>	Schultz	DMB	L	W	DP	
BAP	ACHHUNG	<i>Achnanthes hungarica</i>	(Grun.) Grun.	OVB	L	W	DP	
BAP	ACKOLB	<i>Achnanthes kolbei</i>	Hust.	OVB	L	W	DP	
BAP	ACKRYO	<i>Achnanthes kryophila</i>	Pet.	OVB	L	W	DP	
BAP	ACKRYOA	<i>Achnanthes kryophila</i> var. <i>africana</i>	Choln.	OVB	L	W	DP	
BAP	ACHLANC	<i>Achnanthes lanceolata</i>	(Breb.) Grun.	DMB	L	W	DP	
BAP	ACHLANC?	<i>Achnanthes lanceolata</i> var. (?)		OVB	L	W	DP	
BAP	ACHLANCA	<i>Achnanthes lanceolata</i> var. <i>abbreviata</i>	Reim.	OVB	L	W	DP	
BAP	ACHLANCD	<i>Achnanthes lanceolata</i> var. <i>dubia</i>	Grun.	DMB	L	W	DP	
BAP	ACHLANCE	<i>Achnanthes lanceolata</i> var. <i>elliptica</i>	Schulz	OVB	L	W	DP	
BAP	ACHLANCO	<i>Achnanthes lanceolata</i> var. <i>omissa</i>	Reim.	OVB	L	W	DP	
BAP	ACHLANCR	<i>Achnanthes lanceolata</i> var. <i>rostrata</i>	Hust.	DMB	L	W	DP	
BAP	ACHLAPPN	<i>Achnanthes lapponica</i> var. <i>ninckei</i>	(Guerm. & Mang.) Reim	DMB	L	W	DP	
BAP	ACHLATE	<i>Achnanthes laterostrata</i>	Hust.	OVB	L	W	DP	
BAP	ACHLAUE	<i>Achnanthes lauenbergiana</i>	Hust.	OVB	L	W	DP	
BAP	ACHLEMM	<i>Achnanthes lemmermanni</i>	Hust.	DMB	L	W	DP	
BAP	ACHLEVA	<i>Achnanthes levanderi</i>	Hust.	OVB	L	W	DP	
BAP	ACHLINE	<i>Achnanthes linearis</i>	(W. Sm.) Grun.	DMB	L	W	DP	
BAP	ACHLINEC	<i>Achnanthes linearis</i> f. <i>curta</i>	H.L. Sm.	DMB	L	W	DP	
BAP	ACHMARG	<i>Achnanthes marginulata</i>	Grun.	OVB	L	W	DP	
BAP	ACHMICR	<i>Achnanthes microcephala</i>	(Kutz.) Grun.	DMB	L	W	DP	
BAP	ACHMINU	<i>Achnanthes minutissima</i>	Kutz.	DMB	L	W	DP	

**Standard Operating Procedure for Phytoplankton Analysis**

DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	ACHMINUC	<i>Achnanthes minutissima</i> var. <i>cryptocephala</i>	Grun.	DMB	L	W	DP	
BAP	ACHOEST	<i>Achnanthes oestrupii</i>	(Backm. & A. Cl.) Hust.	OVB	L	W	DP	
BAP	ACHOESTL	<i>Achnanthes oestrupii</i> var. <i>lanceolata</i>	Hust.	OVB	L	W	DP	
BAP	ACHPINN	<i>Achnanthes pinnata</i>	Hust.	OVB	L	W	DP	
BAP	ACHPLOE	<i>Achnanthes ploenensis</i>	Hust.	OVB	L	W	DP	
BAP	ACHSP	<i>Achnanthes</i> sp.		OVB	L	W	DP	
BAP	ACHSUBL	<i>Achnanthes sublaevis</i>	Hust.	DMB	L	W	DP	
BAP	ACHSUCH	<i>Achnanthes suchlandti</i>	Hust.	OVB	L	W	DP	
CHL	ACTACICM	<i>Actinastrum aciculare</i> f. <i>minimum</i>	(Huber-Pest.) Comp.	OVO	L	W		
CHL	ACTGRAC	<i>Actinastrum gracilimum</i>	G.M. Sm.	OVO	L	W		
CHL	ACTHANT	<i>Actinastrum hantzschii</i>	Lag.	OVO	L	W		
BAC	ACYNORM	<i>Actinocyclus normanii</i>	(Juhl.-Dannf.) Hust. (?)	CYL	L	W	DP	D
BAC	ACYNORMS	<i>Actinocyclus normanii</i> f. <i>subsalsa</i>	(Juhl.-Dannf.) Hust.	CYL	L	W	DP	D
BAC	ACYSP	<i>Actinocyclus</i> sp.		CYL	L	W	DP	D
CYA	AGMQUAD	<i>Agmenellum quadruplicatum</i>	(Menegh.) Breb.	SPH				D
CYA	AGMTHER	<i>Agmenellum thermale</i>	(Kutz.) Dr. & Daily	SPH				D
PYR	AMPLUTE	<i>Amphidinium luteum</i>	Skuja	OVO	L	W		
PYR	AMPSPP	<i>Amphidinium</i> sp.		OVO	L	W		
PYR	AMPSP1P	<i>Amphidinium</i> sp. #1		OVO	L	W		
PYR	AMPSP2	<i>Amphidinium</i> sp. #2		OVO	L	W		
PYR	AMPWIGR	<i>Amphidinium wigrense</i>	Wol.	OVO	L	W		
BAP	APLPELL	<i>Amphipleura pellucida</i>	(Kutz.) Kutz.	DMB	L	W	DP	
BAP	APLRUTI	<i>Amphipleura rutilans</i>	(Trente.) Cl.	DMB	L	W	DP	
BAP	AMACOFF	<i>Amphora coffeiformis</i>	(Ag.) Kutz.	DMB	L	W	DP	
BAP	AMAHEMI	<i>Amphora hemicycla</i>	Stoerm. & Yang	DMB	L	W	DP	
BAP	AMAINAR	<i>Amphora inariensis</i>	Kram.	DMB	L	W	DP	
BAP	AMANEGL	<i>Amphora neglecta</i>	Stoerm. & Yang	DMB	L	W	DP	
BAP	AMAOVAL	<i>Amphora ovalis</i>	(Kutz.) Kutz.	DMB	L	W	DP	
BAP	AMAOVAL?	<i>Amphora ovalis</i> var. (?)		DMB	L	W	DP	
BAP	AMAOVALA	<i>Amphora ovalis</i> var. <i>affinis</i>	(Kutz.) V.H. ex DeT.	DMB	L	W	DP	
BAP	AMAOVALP	<i>Amphora ovalis</i> var. <i>pediculus</i>	(Kutz.) V.H. ex DeT.	DMB	L	W	DP	
BAP	AMAPERP	<i>Amphora perpusilla</i>	(Grun.) Grun.	DMB	L	W	DP	
BAP	AMASP	<i>Amphora</i> sp.		DMB	L	W	DP	
BAP	AMASP1	<i>Amphora</i> sp. # 1 (very fine striae)		DMB	L	W	DP	
BAP	AMATENU	<i>Amphora tenuistriata</i>	Mang. in Bourr. & Mang.	DMB	L	W	DP	
BAP	AMATHUM	<i>Amphora thumensis</i>	(Mayer) Cl.-Euler.	DMB	L	W	DP	
BAP	AMAVENEC	<i>Amphora veneta</i> var. <i>capitata</i>	Haworth	DMB	L	W	DP	
CYA	ANBCIRC	<i>Anabaena circinalis</i>	Rabh.	OVO	L	W		
CYA	ANBFLOS	<i>Anabaena flos-aquae</i>	(Lyngb.) Breb.	OVO	L	W		
CYA	ANBSP	<i>Anabaena</i> sp.		OVO	L	W		
CYA	ANBSP1	<i>Anabaena</i> sp. #1		OVO	L	W		
CYA	ANBSPIR	<i>Anabaena spiroides</i>	Kleb.	OVO	L	W		
CYA	ANBSPCR	<i>Anabaena spiroides</i> var. <i>crassa</i>	Lemm.	OVO	L	W		
CYA	ANACYAN	<i>Anacystis cyanea</i>	Dr. & Daily	OVO	L	W		
CYA	ANADIMID	<i>Anacystis dimidiata</i>	(Kutz.) Dr. & Daily	OVO	L	W		
CYA	ANADIMIN	<i>Anacystis diminuta</i>	Dr. & Daily	OVO	L	W		
CYA	ANAINCE	<i>Anacystis incerta</i>	(Lemm.) Dr. & Daily	SPH				D
CYA	ANAMARI	<i>Anacystis marina</i>	(Hansg.) Dr. & Daily	SPH				D
CYA	ANAMONTM	<i>Anacystis montana</i> f. <i>minor</i>	Dr. & Daily	SPH				D

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CYA	ANATHER	Anacystis thermalis	(Menegh.) Dr. & Daily	OVO	L	W		
CYA	ANATHERM	Anacystis thermalis f. major	(Lag.) Dr. & Daily	OVO	L	W		
CHL	ANKBRAU	Ankistrodesmus braunii	(Naeg.) Brun.	FUS	L	W		
CHL	ANKCONVM	Ankistrodesmus convolutus var. minutus	(Nag.) Rabh.	FUS	L	W		
CHL	ANKFALC	Ankistrodesmus falcatus	(Corda) Ralfs	FUS	L	W		
CHL	ANKFALCF	Ankistrodesmus falcatus var. fasciculatus	(Corda.)	FUS	L	W		
CHL	ANKFALCM	Ankistrodesmus falcatus var. mirabilis	(W. & G.S. West) G.S. West	FUS	L	W		
CHL	ANKGELI	Ankistrodesmus gelifactum	(Chod.) Bourr.	FUS	L	W		
CHL	ANKGRAC	Ankistrodesmus gracilis	(Reins.) Kors.	FUS	L	W		
CHL	ANKSETI	Ankistrodesmus setigerus	(Schroed.) G.S. West	FUS	L	W		
CHL	ANKSPI	Ankistrodesmus sp.		FUS	L	W		
CHL	ANKSP1	Ankistrodesmus sp. #1		FUS	L	W		
CHL	ANKSP2	Ankistrodesmus sp. #2		FUS	L	W		
CHL	ANKSPIR	Ankistrodesmus spiralis	(Turn.) Lemm.	FUS	L	W		
CHL	ANKSTIP	Ankistrodesmus stipitatus	(Chod.) Kom.-Legn.	FUS	L	W		
CHL	AKYJUDA	Ankyra judayi	(G.M. Sm.) Fott	FUS	L	W		
CHL	AKYLANC	Ankyra lanceolata	(Kors.) Fott	FUS	L	W		
CHL	AKYSP	Ankyra sp.		FUS	L	W		
BAP	ANOSERIB	Anomoeoneis serians var. brachysira	(Breb.) Hust.	DMB	L	W	DP	
BAP	ANOSP	Anomoeoneis sp.		DMB	L	W	DP	
BAP	ANOVITR	Anomoeoneis vitrea	(Grun.) Ross	DMB	L	W	DP	
CYA	APHFLOS	Aphanizomenon flos-aquae	(Lyngb.) Ralfs	CYL	L	W	DP	D
CYA	APHSP	Aphanizomenon sp.		CYL	L	W	DP	D
CYA	APHCLAT	Aphanothece clathrata	W. & G.S. West	CYL	L	W	DP	D
CYA	ANAMONTG	Aphanothece gelatinosa	(Henn.) Lemm.	OVO	L	W		
CYA	APHNIDU	Aphanothece nidulans	Richt.	OVO	L	W		
CHL	ARTBIFI	Arthrodesmus bifidus	Breb.	OVO	L	W		
CHL	ARTSP	Arthrodesmus sp.		OVO	L	W		
CHL	ARTTRIA	Arthrodesmus triangularis	Lag.	OVO	L	W		
BAP	ASTFORM	Asterionella formosa	Hass.	RTB	L	W	DP	
BAP	ASTFORMG	Asterionella formosa var. gracillima	(Hantz.) Grun.	RTB	L	W	DP	
BAP	ASTRALF	Asterionella ralfsii	W. Sm.	RTB	L	W	DP	
CHL	ASTSUPE	Asterococcus superbus	(Cienk.) Scherf.	OVO	L	W		
BAC	ATTZACH	Attheya zachariasi	Brun.	CYL	L	W	DP	D
BAC	AULAGASM	Aulacoseira agassizii var. malayensis	(Hust.) Simonsen	CYL	L	W	DP	D
BAC	AULAMBI	Aulacoseira ambigua	(Grun.) Simonsen	CYL	L	W	DP	D
BAC	AULDIST	Aulacoseira distans	(Ehr.) Simonsen	CYL	L	W	DP	D
BAC	AULDISTL	Aulacoseira distans var. limnetica	(O. Mull.) Simonsen	CYL	L	W	DP	D
BAC	AULEPID	Aulacoseira epidendron	(Ehr.) Crawford	CYL	L	W	DP	D
BAC	AULGRAN	Aulacoseira granulata	(Ehr.) Simonsen	CYL	L	W	DP	D
BAC	AULGRANA	Aulacoseira granulata var. angustissima	(O. Mull.) Simonsen	CYL	L	W	DP	D
BAC	AULGRANV	Aulacoseira granulata var. valida	(Hust.) Simonsen	CYL	L	W	DP	D
BAC	AULISLA	Aulacoseira islandica	(O. Mull.) Simonsen	CYL	L	W	DP	D
BAC	AULITAL	Aulacoseira italicica	(Ehr.) Simonsen	CYL	L	W	DP	D
BAC	AULITALT	Aulacoseira italicica var. tenuissima	(Grun.) Simonsen	CYL	L	W	DP	D
BAC	AULLIRAA	Aulacoseira lirata var. alpigena	(Grun.) Haworth	CYL	L	W	DP	D
BAC	AULSUBA	Aulacoseira subarctica	(O. Mull.) Haworth	CYL	L	W	DP	D
CHR	AULPURD	Aulomonas purdyi	(Lack) Willen	OVO	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHR	BICCAMP	Bicoeca campanulata	(Lack.) Bourr. emend. Skuja	OVO	L	W		
CHR	BICCRYS	Bicoeca crystallina	Skuja	OVO	L	W		
CHR	BICLACU	Bicoeca lacustris	J. Clark	OVO	L	W		
CHR	BICMITR	Bicoeca mitra var. (?)		OVO	L	W		
CHR	BICMITRS	Bicoeca mitra var. suecica	Skuja	OVO	L	W		
CHR	BICPARO	Bicoeca paropsis	Skuja	OVO	L	W		
CHR	BICPETI	Bicoeca petiolata	(Stein) Pringsh.	OVO	L	W		
CHR	BICPLAN	Bicoeca planktonica	Kiss.	OVO	L	W		
CHR	BICSOCI	Bicoeca socialis	Laut.	OVO	L	W		
CHR	BICSP	Bicoeca sp.		OVO	L	W		
CHR	BICSP1	Bicoeca sp. #1		OVO	L	W		
CHR	BICSP2	Bicoeca sp. #2		OVO	L	W		
CHR	BICSP4	Bicoeca sp. #4		OVO	L	W		
CHR	BICSP5	Bicoeca sp. #5		OVO	L	W		
CHR	BICTUBI	Bicoeca tubiformis	Skuja	OVO	L	W		
CHR	BITCHOD	Bitrichia chodatii	(Rev.) Chod.	OVO	L	W		
CHR	BITLONG	Bitrichia longispina	(Lund) Bourr.	OVO	L	W		
CHR	BITOHRI	Bitrichia ohridiana	(Fott) Nich.	OVO	L	W		
CHR	BITOLLU	Bitrichia ollula	(Fott) Nich.	OVO	L	W		
CHR	BITSP	Bitrichia sp.		OVO	L	W		
CHM	BODSP	Bodopsis sp.		OVO	L	W		
CHL	BOTBRAU	Botryococcus braunii	Kutz.	OVO	L	W		
CHL	BOTSPC	Botryococcus sp.		OVO	L	W		
CHL	BOTSPS	Botrysphaera sp.		OVO	L	W		
CHL	BRASP?)	Brachiomonas sp. (?)		OVO	L	W		
BAP	CALBACIT	Caloneis bacillaris var. thermalis	(Grun.) A. Cl.(?)	OVB	L	W	DP	
BAP	CALBACI	Caloneis bacillum	(Grun.) Cl.	OVB	L	W	DP	
BAP	CALHYAL	Caloneis hyalina	Hust.	OVb	L	W	DP	
BAP	CALSP	Caloneis sp.		OVb	L	W	DP	
BAP	CALVENTM	Caloneis ventricosa var. minuta	(Grun.) Mills	OVb	L	W	DP	
BAP	CALVENTT	Caloneis ventricosa var. truncata	Grun.	OVb	L	W	DP	
CHL	CARCORD	Carteria cordiformis	(Carter) Diesing	OVO	L	W		
CHL	CARSP	Carteria sp.		OVO	L	W		
CHL	CARWISC	Carteria wisconsinensis	Huber-Pest.	OVO	L	W		
BAC	CENTRIC	Centric		CYL	L	W	DP	D
XAN	CENBELA	Centrictractus belanophorus	Lemm.	OVO	L	W		
PYR	CERHIRU	Ceratium hirundinella	(O.F. Mull.) Schr.	CER	L	W	DP	D
BAC	CTOSP	Chaetoceros sp.		CYL	L	W	DP	D
CHL	CHMSP	Characium sp.		FUS	L	W		
CRY	CHISP	Chilomonas sp.		OVO	L	W		
CRY	CHISP1	Chilomonas sp. #1		OVO	L	W		
CHL	CHLGLOB	Chlamydomonas globosa	Snow	SPH				D
CHL	CHLSP	Chlamydomonas sp.		OVO	L	W		
CHL	CHLSPVOI	Chlamydomonas sp. - ovoid		OVO	L	W		
CHL	CHLSPPHE	Chlamydomonas sp. - sphere		SPH				D
CHL	CHLSP1	Chlamydomonas sp. # 1		OVO	L	W		
CHL	CRLSP	Chlorella sp.		OVO	L	W		
XAN	CLBPOLY	Chlorobotrys polychloris	Pasch. (?)	OVO	L	W		
XAN	CLBSP	Chlorobotrys sp.		OVO	L	W		
CHL	CBHSP	Chlorobrachis sp.		OVO	L	W		
CHL	CHGMINI	Chlorogonium minimum	Playf.	OVO	L	W		
CHL	CHGSP	Chlorogonium sp.		OVO	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHR	CHO	Choanoflagellate	OVO	L	W			
CHL	CDASUBS	Chodatella subsalsa	Lemm.	OVO	L	W		
CHL	CDPSP	Chodatellopsis sp.		OVO	L	W		
CHR	CHMECHI	Chromulina echinocystis	Conr. (?)	OVO	L	W		
CHR	CHMERKE	Chromulina erkensis	Skuja	OVO	L	W		
CHR	CHMSPM	Chromulina sp.		OVO	L	W		
CHR	CHMSP1	Chromulina sp. #1		OVO	L	W		
CHR	CHMZART	Chromulina zartensis	Doff.	OVO	L	W		
CYA	CRODISP	Chroococcus dispersus	(Kiessl.) Lemm.	OVO	L	W		
CYA	CROLIMN	Chroococcus limneticus	Lemm.	OVO	L	W		
CYA	CROSP	Chroococcus sp.		OVO	L	W		
CYA	CROTURG	Chroococcus turgidus	(Kutz.) Naegeli	OVO	L	W		
CRY	CMSACUT	Chroomonas acuta	Uterm.	OVO	L	W		
CRY	CMSCAUD	Chroomonas caudata	Geitl.	OVO	L	W		
CRY	CMSNORD	Chroomonas nordstedtii	Hansg.	OVO	L	W		
CRY	CMSPOCH	Chroomonas pochamanni	Huber-Pest.	OVO	L	W		
CHR	CRNINSI	Chrysarachnion insidians	Pasch.	OVO	L	W		
CHR	CHRSP	Chrysococcus sp.		OVO	L	W		
CHR	CHRSP1	Chrysococcus sp. #1		OVO	L	W		
CHR	CYKANGU	Chrysolykos angulatus	(Willen) Nauw.	OVO	L	W		
CHR	CYKPLAN	Chrysolykos planktonicus	Mack.	OVO	L	W		
CHR	CYKSKUJ	Chrysolykos skujae	(Nauw.) Bourr.	OVO	L	W		
CHR	CYKSP	Chrysolykos sp.		OVO	L	W		
CHR	CPNCOCC	Chrysophycean coccoids		OVO	L	W		
CHR	CSLCONR	Chrysosphaerella conradi	Bourr.	OVO	L	W		
CHR	CSLLONG	Chrysosphaerella longispina	Laut. emend. Nich.	OVO	L	W		
CHR	CSLRODH	Chrysosphaerella rodhei	Skuja	OVO	L	W		
CHR	CHYSP	Chrysosphaerella sp.		OVO	L	W		
CHL	CLOACICC	Closteriopsis acicularis	(G.M. Sm.) Belch & Swale	FUS	L	W		
CHL	CLOLONG	Closteriopsis longissima	(Lemm.) Lemm.	FUS	L	W		
CHL	CLOLONGA	Closteriopsis longissima var. acicularis	G.M. Sm.	FUS	L	W		
CHL	CLOSPC	Closteriopsis sp.		FUS	L	W		
CHL	CLOACICD	Closterium aciculare	T. West	FUS	L	W		
CHL	CLOACICS	Closterium aciculare var. subpronum	W. & G.S. West	FUS	L	W		
CHL	CLOACUTV	Closterium acutum var. variabile	(Lemm.) Krieg.	FUS	L	W		
CHL	CLOEXIL	Closterium exile	W. & G.S. West	FUS	L	W		
CHL	CLOGRAC	Closterium gracile	Breb.	FUS	L	W		
CHL	CLOPARV	Closterium parvulum	Nag.	FUS	L	W		
CHL	CLOSPD	Closterium sp.		FUS	L	W		
CHL	CLOSP1	Closterium sp. #1		FUS	L	W		
CHL	CLOSP3	Closterium sp. #3		FUS	L	W		
CHL	CLOSTRIE	Closterium strigosum var. elegans	(G.S. West) Krieg.	FUS	L	W		
CYA	COCELAB	Coccochloris elabens	Dr. & Daily	OVO	L	W		
CYA	COCPENI	Coccochloris peniocystis	(Kutz.) Dr. & Daily	OVO	L	W		
CYA	COCTAG	Coccochloris stagnina	Sprengel	OVO	L	W		
CHL	COCACIC	Coccoid acicular		FUS	L	W		
CHL	COCARCU	Coccoid arcuate		FUS	L	W		
CHL	COCBACI	Coccoid bacilliform		CYL	L	W	DP	D
CHL	COCBICE	Coccoid bicells		DBL	L	W	DP	
CHL	COCCYMB	Coccoid cymbelloid		FUS	L	W		
CHL	COCFUSI	Coccoid fusiform		FUS	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	COCFUSIB	Coccoid fusiform bicells		FUS	L	W		
CHL	COCLUNA	Coccoid lunate		FUS	L	W		
CHL	COCOOCYB	Coccoid oocystis-like bicell		OVO	L	W		
CHL	COCOOCYC	Coccoid oocystis-like cell		OVO	L	W		
CHL	COCOVAL	Coccoid oval		OVO	L	W		
CHL	COCRENI	Coccoid reniform		OVO	L	W		
CHL	COCSP1	Coccoid sp. #1		OVO	L	W		
CHL	COCSP2C	Coccoid sp. #2		OVO	L	W		
CHL	COCSP3	Coccoid sp. #3		OVO	L	W		
CHL	COCSP4	Coccoid sp. #4		OVO	L	W		
CHL	COCSP5	Coccoid sp. #5		OVO	L	W		
CHL	COCSP6	Coccoid sp. #6		OVO	L	W		
CHL	COCSP7	Coccoid sp. #7		OVO	L	W		
CHL	COCSPHE	Coccoid sphere		SPH				D
BAP	COCDIMI	Coccconeis diminuta	Pant.	OVB	L	W	DP	
BAP	COCDISC	Coccconeis disculus	(Schum.) Cl.	OVB	L	W	DP	
BAP	COCDISC?	Coccconeis disculus var. (?)		OVB	L	W	DP	
BAP	COCPEDI	Coccconeis pediculus	Ehr.	OVB	L	W	DP	
BAP	COCPLAC	Coccconeis placentula	Ehr.	OVB	L	W	DP	
BAP	COCPLACE	Coccconeis placentula var. euglypta	(Ehr.) Cl.	OVB	L	W	DP	
BAP	COCPLACL	Coccconeis placentula var. lineata	(Ehr.) V.H.	OVB	L	W	DP	
BAP	COCPLACR	Coccconeis placentula var. rouxii	(Herib. & Brun.)	OVB	L	W	DP	
BAP	COCCSP	Coccconeis sp.		OVB	L	W	DP	
BAP	COCSP2B	Coccconeis sp. # 2 (GLRD)		OVB	L	W	DP	
BAP	COCTHUM	Coccconeis thumensis	A. Mayer	OVB	L	W	DP	
CRY	CODINCL	Codonoeeca inclinata	Kent (?)	OVO	L	W		
CHR	CODBOTR	Codonosiga botrys	(Ehr.) Kent	OVO	L	W		
CHR	CODSP	Codonosiga sp.		OVO	L	W		
CHR	CODROBI	Codonosigopsis robini	Senn.	OVO	L	W		
CHL	COEASTR	Coelastrum astroideum	De-Not	OVO	L	W		
CHL	COECAMB	Coelastrum cambricum	Arch.	OVO	L	W		
CHL	COEMICR	Coelastrum microporum	Nag. in A. Braun	OVO	L	W		
CHL	COEMORU	Coelastrum morus	W. & G.S. West	OVO	L	W		
CHL	COEPSEU	Coelastrum pseudomicroporum	Kors.	OVO	L	W		
CHL	COERETI	Coelastrum reticulatum	(Dang.) Senn.	OVO	L	W		
CHL	COESPT	Coelastrum sp.		OVO	L	W		
CHL	COESP1	Coelastrum sp. #1		OVO	L	W		
CHL	COESPHA	Coelastrum sphaericum	Nag.	OVO	L	W		
CYA	COESPP	Coelosphaerium sp.		OVO	L	W		
CHL	COESPY	Coenocystis sp.		OVO	L	W		
CHL	COLUNKN	Colonial unknown green		OVO	L	W		
CHR	COLCOCC	Colorless coccoids		OVO	L	W		
CHR	COLFLAG1	Colorless flagellate #1		OVO	L	W		
CHR	COLFLAG2	Colorless flagellate #2		OVO	L	W		
CHR	COLFLAG3	Colorless flagellate #3		OVO	L	W		
CHR	COLFLAGC	Colorless flagellate colonial		OVO	L	W		
CHR	COLFLAGO	Colorless flagellate ovoid		OVO	L	W		
CHR	COLFLAGS	Colorless flagellate spherical		SPH				D
CHR	COLQUAD	Colorless quadriflagellates		OVO	L	W		
CHL	CORSP?	Coronastrum sp. (?)		OVO	L	W		
BAC	COSLACU	Coscinodiscus lacustris	Grun.	CYL	L	W	DP	D
BAC	COSLACUS	Coscinodiscus lacustris var. septentrionalis	Grun.	CYL	L	W	DP	D

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAC	COSROTHS	<i>Coscinodiscus rothii</i> var. <i>subsalsa</i>		CYL	L	W	DP	D
BAC	COSSPB	<i>Coscinodiscus</i> sp.		CYL	L	W	DP	D
BAC	COSSP1B	<i>Coscinodiscus</i> sp. #1		CYL	L	W	DP	D
CHL	COSBOTR	<i>Cosmarium botrytis</i>	Menegh.	OVO	L	W		
CHL	COSDEPR	<i>Cosmarium depressum</i>	(Nag.) Lund	OVO	L	W		
CHL	COSMELA	<i>Cosmarium melanosporum</i>	Arch.	OVO	L	W		
CHL	COSPHAS	<i>Cosmarium phaseolus</i>	Breb. (?)	OVO	L	W		
CHL	COSREGN	<i>Cosmarium regnelli</i>	Wille	OVO	L	W		
CHL	COSSPD	<i>Cosmarium</i> sp.		OVO	L	W		
CHL	COSSP1D	<i>Cosmarium</i> sp. #1		OVO	L	W		
CHL	COSSP2	<i>Cosmarium</i> sp. #2		OVO	L	W		
CHL	COSSUBC	<i>Cosmarium subcostatum</i>	Nordst.	OVO	L	W		
CHL	CRUFENE	<i>Crucigenia fenestrata</i>	Schmidle	OVO	L	W		
CHL	CRUIRRE	<i>Crucigenia irregularis</i>	Wille	OVO	L	W		
CHL	CRUPULC	<i>Crucigenia pulchra</i>	(W. & G. S. West) Kom.	OVO	L	W		
CHL	CRUQUAD	<i>Crucigenia quadrata</i>	Morr.	OVO	L	W		
CHL	CRURECT	<i>Crucigenia rectangularis</i>	A. Braun	OVO	L	W		
CHL	CRUSP	<i>Crucigenia</i> sp.		OVO	L	W		
CHL	CRUTETR	<i>Crucigenia tetrapedia</i>	(Kirch.) W. & G.S. West	OVO	L	W		
CHL	CRUTRUN	<i>Crucigenia truncata</i>	G.M. Sm.	OVO	L	W		
CHL	CROCRAS	<i>Crucigloea crassiseta</i>	(Skuja) Soeder	OVO	L	W		
CRY	CRYBREV	<i>Cryptomonas brevis</i>	Schill.	OVO	L	W		
CRY	CRYCAUD	<i>Cryptomonas caudata</i>	Schill.	OVO	L	W		
CRY	CRYCURV	<i>Cryptomonas curvata</i>	Ehr.	OVO	L	W		
CRY	CRYEROS	<i>Cryptomonas erosa</i>	Ehr.	OVO	L	W		
CRY	CRYEROSR	<i>Cryptomonas erosa</i> var. <i>reflexa</i>	Marss.	OVO	L	W		
CRY	CRYLOBA	<i>Cryptomonas lobata</i>	Kors.	OVO	L	W		
CRY	CRYMARS	<i>Cryptomonas marssonii</i>	Skuja	OVO	L	W		
CRY	CRYMARS?	<i>Cryptomonas marssonii</i> var. (?)		OVO	L	W		
CRY	CRYOBOV	<i>Cryptomonas obovata</i>	Skuja	OVO	L	W		
CRY	CRYOVAT	<i>Cryptomonas ovata</i>	Ehr.	OVO	L	W		
CRY	CRYPARA	<i>Cryptomonas parapyrenoidifera</i>	Skuja	OVO	L	W		
CRY	CRYPHAS	<i>Cryptomonas phaseolus</i>	Skuja	OVO	L	W		
CRY	CRYPLAT	<i>Cryptomonas platyuris</i>	Skuja	OVO	L	W		
CRY	CRYPYRE	<i>Cryptomonas pyrenoidifera</i>	Geitl.	OVO	L	W		
CRY	CRYREFL	<i>Cryptomonas reflexa</i>	Skuja	OVO	L	W		
CRY	CRYROST	<i>Cryptomonas rostratiformis</i>	Skuja	OVO	L	W		
CRY	CRYSP	<i>Cryptomonas</i> sp.		OVO	L	W		
CRY	CRYSP1	<i>Cryptomonas</i> sp. #1		OVO	L	W		
CRY	CRYSP2	<i>Cryptomonas</i> sp. #2		OVO	L	W		
CRY	CRYSP3	<i>Cryptomonas</i> sp. #3		OVO	L	W		
CRY	CRYTENU	<i>Cryptomonas tenuis</i>	Pasch.	OVO	L	W		
CRY	CRYTETR	<i>Cryptomonas tetrapyrenoidosa</i>	Skuja	OVO	L	W		
CYA	CYASP	<i>Cyanarcus</i> sp.		FUS	L	W		
CYA	CYASP1	<i>Cyanarcus</i> sp. #1		FUS	L	W		
BAC	CYS COST	<i>Cyclostephanos costatilimbus</i>	(Kobayasi & Kobayashi) Stoermer, Hakansson	CYL	L	W	DP	D
BAC	CYS DUBI	<i>Cyclostephanos dubius</i>	(Fricke) Round	CYL	L	W	DP	D
BAC	CYS INV1	<i>Cyclostephanos invisitatus</i>	(Hohn & Hellerman) Ther. Stoer. Hak. 198	CYL	L	W	DP	D

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BAC	CYSSP	Cyclostephanos sp.		CYL	L	W	DP	D
BAC	CYSTHOL	Cyclostephanos tholiformis	Stoerm. Hak. & Ther.	CYL	L	W	DP	D
BAC	CYCANTI	Cyclotella antiqua	W. Sm.	CYL	L	W	DP	D
BAC	CYCANTI?	Cyclotella antiqua var. (?)		CYL	L	W	DP	D
BAC	CYCATOM	Cyclotella atomus	Hust.	CYL	L	W	DP	D
BAC	CYCATOM?	Cyclotella atomus var. #2 (no process)		CYL	L	W	DP	D
BAC	CYCCATE	Cyclotella catenata	Brun.	CYL	L	W	DP	D
BAC	CYCCOMES	Cyclotella comensis	Grun.	CYL	L	W	DP	D
BAC	CYCCOMRC	Cyclotella comensis rough center w/ process	in house taxon	CYL	L	W	DP	D
BAC	CYCCOME1	Cyclotella comensis var. 1		CYL	L	W	DP	D
BAC	CYCCOME2	Cyclotella comensis var. 2 (plain center)		CYL	L	W	DP	D
BAC	CYCCOMER	Cyclotella comensis var. 2 (rough center)		CYL	L	W	DP	D
BAC	CYCCOMEN	Cyclotella comensis var. 2 (w/ process)		CYL	L	W	DP	D
BAC	CYCCOME3	Cyclotella comensis var. 3		CYL	L	W	DP	D
BAC	CYCCOMT	Cyclotella comta	(Ehr.) Kutz.	CYL	L	W	DP	D
BAC	CYCCOMTO	Cyclotella comta var. oligactis	(Ehr.) Grun.	CYL	L	W	DP	D
BAC	CYCCMUNI	Cyclotella comta var. unipunctata	Grun.	CYL	L	W	DP	D
BAC	CYCCR1	Cyclotella CRL#1		CYL	L	W	DP	D
BAC	CYCCR2	Cyclotella CRL#2		CYL	L	W	DP	D
BAC	CYCCR3	Cyclotella CRL#3		CYL	L	W	DP	D
BAC	CYCCRYP	Cyclotella cryptica	Reimann. Lewin. & Guillard.	CYL	L	W	DP	D
BAC	CYCDELI	Cyclotella delicatula	Hust.	CYL	L	W	DP	D
BAC	CYCGAMM	Cyclotella gamma	Sov.	CYL	L	W	DP	D
BAC	CYCGLOM	Cyclotella glomerata	Bachm.	CYL	L	W	DP	D
BAC	CYCKRAM	Cyclotella krammeri	Hak.	CYL	L	W	DP	D
BAC	CYKUET	Cyclotella kuetzingiana	Thw.	CYL	L	W	DP	D
BAC	CYCROSSI	Cyclotella kuetzingiana var. radiosa	Fricke	CYL	L	W	DP	D
BAC	CYCMENE	Cyclotella meneghiniana	Kutz.	CYL	L	W	DP	D
BAC	CYCMICH	Cyclotella michiganiana	Skv.	CYL	L	W	DP	D
BAC	CYCOCEL	Cyclotella ocellata	Pant.	CYL	L	W	DP	D
BAC	CYCOPER	Cyclotella operculata	(Ag.) Kutz.	CYL	L	W	DP	D
BAC	CYCOPERU	Cyclotella operculata var. unipunctata	Hust.	CYL	L	W	DP	D
BAC	CYCPSEU	Cyclotella pseudostelligera	Hust.	CYL	L	W	DP	D
BAC	CYCSOCI	Cyclotella socialis	Schutt (?)	CYL	L	W	DP	D
BAC	CYCSP	Cyclotella sp.		CYL	L	W	DP	D
BAC	CYCSP1	Cyclotella sp. #1		CYL	L	W	DP	D
BAC	CYCSP2	Cyclotella sp. #2		CYL	L	W	DP	D
BAC	CYCSP3	Cyclotella sp. #3		CYL	L	W	DP	D
BAC	CYCSP4	Cyclotella sp. #4		CYL	L	W	DP	D
BAC	CYCSP5	Cyclotella sp. #5		CYL	L	W	DP	D
BAC	CYCSTEL	Cyclotella stelligera	(Cl. & Grun.) V.H.	CYL	L	W	DP	D
BAC	CYCSTRI	Cyclotella striata	(Kutz.) Grun.	CYL	L	W	DP	D
BAC	CYCWOLT	Cyclotella wolterecki	Hust.	CYL	L	W	DP	D
BAP	CYMANGUA	Cymatopleura angulata	Greville	DBB	L	W	DP	
BAP	CYMELLI	Cymatopleura elliptica	(Breb. & Godey) W. Sm.	OVB	L	W	DP	
BAP	CYMELLI?	Cymatopleura elliptica var. (?)		OVB	L	W	DP	
BAP	CYMSOLE	Cymatopleura solea	(Breb. & Godey) W. Sm.	DBB	L	W	DP	
BAP	CYMSOLE?	Cymatopleura solea var. (?)		DBB	L	W	DP	
BAP	CYMSOLEA	Cymatopleura solea var. apiculata	(W. Sm.) Ralfs	DBB	L	W	DP	
BAP	CYMSOLER	Cymatopleura solea var. regula	(Ehr.) Grun.	DBB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	CYMSOLES	<i>Cymatopleura solea</i> var. <i>subconstricta</i>	D.M.	DBB	L	W	DP	
BAP	CYMAFFI	<i>Cymbella affinis</i>	Kutz.	DMB	L	W	DP	
BAP	CYMAMPH	<i>Cymbella amphicephala</i>	Nag.	DMB	L	W	DP	
BAP	CYMANGUB	<i>Cymbella angustata</i>	(W. Sm.) Cl.	DMB	L	W	DP	
BAP	CYMCESA	<i>Cymbella cesatii</i>	(Rabh.) Grun. ex A.S.	DMB	L	W	DP	
BAP	CYMCIST	<i>Cymbella cistula</i>	(Ehr.) Kirchn.	DMB	L	W	DP	
BAP	CYMCISTG	<i>Cymbella cistula</i> var. <i>gibbosa</i>	Brun	DMB	L	W	DP	
BAP	CYMCISTM	<i>Cymbella cistula</i> var. <i>maculata</i>	(Kutz.) V.H.	DMB	L	W	DP	
BAP	CYMCUSP	<i>Cymbella cuspidata</i>	Kutz.	DMB	L	W	DP	
BAP	CYMCYMB	<i>Cymbella cymbiformis</i>	Ag.	DMB	L	W	DP	
BAP	CYMDELI	<i>Cymbella delicatula</i>	Kutz.	DMB	L	W	DP	
BAP	CYMDILU	<i>Cymbella diluviana</i>	(Krasske) C. E.	DMB	L	W	DP	
BAP	CYMHUST	<i>Cymbella hustedtii</i>	Krasske	DMB	L	W	DP	
BAP	CYMHYBR	<i>Cymbella hybrida</i>	Grun.	DMB	L	W	DP	
BAP	CYMLAEV	<i>Cymbella laevis</i>	Nag. ex Kutz.	DMB	L	W	DP	
BAP	CYMLANC	<i>Cymbella lanceolata</i>	(Ag.) Ag.	DMB	L	W	DP	
BAP	CYMLEPTR	<i>Cymbella leptoceros</i> var. <i>rostrata</i>	Hust.	DMB	L	W	DP	
BAP	CYMLUNA	<i>Cymbella lunata</i>	W. Sm.	DMB	L	W	DP	
BAP	CYMMEXI	<i>Cymbella mexicana</i>	(Ehr.) Cl.	DMB	L	W	DP	
BAP	CYMMICR	<i>Cymbella microcephala</i>	Grun.	DMB	L	W	DP	
BAP	CYMMINU	<i>Cymbella minuta</i>	Hilse ex Rabh.	DMB	L	W	DP	
BAP	CYMMINUL	<i>Cymbella minuta</i> f. <i>latens</i>	(Krasske) Reim.	DMB	L	W	DP	
BAP	CYMMINUP	<i>Cymbella minuta</i> var. <i>pseudogracilis</i>	(Choln.) Reim.	DMB	L	W	DP	
BAP	CYMMINUS	<i>Cymbella minuta</i> var. <i>silesiaca</i>	(Bleisch ex Rabh.) Reim.	DMB	L	W	DP	
BAP	CYMNAVI	<i>Cymbella naviculiformis</i>	Auersw.	DMB	L	W	DP	
BAP	CYMNORV	<i>Cymbella norvegica</i>	Grun.	DMB	L	W	DP	
BAP	CYMOBTU	<i>Cymbella obtusiuscula</i>	(Kutz.) Grun.	DMB	L	W	DP	
BAP	CYMPROS	<i>Cymbella prostrata</i>	(Berk.) Cl.	DMB	L	W	DP	
BAP	CYMPROAU	<i>Cymbella prostrata</i> var. <i>auerswaldii</i>	(Rabh.) Reim.	DMB	L	W	DP	
BAP	CYMPUSI	<i>Cymbella pusilla</i>	Grun.	DMB	L	W	DP	
BAP	CYMSINU	<i>Cymbella sinuata</i>	Greg.	DMB	L	W	DP	
BAP	CYMSINUA	<i>Cymbella sinuata</i> var. <i>antiqua</i>	(Grun.) Cl.	DMB	L	W	DP	
BAP	CYMSP	<i>Cymbella</i> sp.		DMB	L	W	DP	
BAP	CYMSP?	<i>Cymbella</i> sp. DL #2		DMB	L	W	DP	
BAP	CYMTRIA	<i>Cymbella triangulum</i>	(Ehr.) Cl.	DMB	L	W	DP	
BAP	CYMTUMIA	<i>Cymbella tumida</i>	(Breb. ex Kutz.) V.H.	DMB	L	W	DP	
BAP	CYMTUMIU	<i>Cymbella tumidula</i>	Grun. ex A.S.	DMB	L	W	DP	
CYA	DACACIC	<i>Dactylococcopsis acicularis</i>	Lemm.	FUS	L	W		
CYA	DACSMIT	<i>Dactylococcopsis smithii</i>	Chod. & Chod.	FUS	L	W		
CYA	DACSP	<i>Dactylococcopsis</i> sp.		FUS	L	W		
CHL	DACINFU	<i>Dactylococcus infusionum</i>	Nag.	FUS	L	W		
BAP	DENELEG	<i>Denticula elegans</i>	Kutz.	OVB	L	W	DP	
BAP	DENSP	<i>Denticula</i> sp.		DMB	L	W	DP	
BAP	DENSUBT	<i>Denticula subtilis</i>	Grun.	DMB	L	W	DP	
BAP	DENTENU	<i>Denticula tenuis</i>	Kutz.	DMB	L	W	DP	
BAP	DENTENUC	<i>Denticula tenuis</i> var. <i>crassula</i>	(Nag.) W. & G.S. West	OVB	L	W	DP	
CHR	DESBRAC	<i>Desmarella brachycalyx</i>	Skuja	OVO	L	W		
CHR	DESMONI	<i>Desmarella moniliformis</i>	Kent	OVO	L	W		
CHR	DESSP	<i>Desmarella</i> sp.		OVO	L	W		
BAP	DIAANCE	<i>Diatoma anceps</i>	(Ehr.) Kirchn.	RTB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	DIAHIEM	Diatoma hiemale	(Roth) Heib.	RTB	L	W	DP	
BAP	DIAHIEMM	Diatoma hiemale var. mesodon	(Ehr.) Grun.	RTB	L	W	DP	
BAP	DIASP	Diatoma sp.		RTB	L	W	DP	
BAP	DIATENU	Diatoma tenue	Ag.	RTB	L	W	DP	
BAP	DIATENUE	Diatoma tenue var. elongatum	Lyngb.	RTB	L	W	DP	
BAP	DIAVULG	Diatoma vulgare	Bory.	RTB	L	W	DP	
CHL	DICEHRE	Dictyosphaerium ehrenbergianum	Nag.	OVO	L	W		
CHL	DICELEG	Dictyosphaerium elegans	(Bachm.)	OVO	L	W		
CHL	DICPULC	Dictyosphaerium pulchellum	Wood	OVO	L	W		
CHL	DICSP	Dictyosphaerium sp.		OVO	L	W		
CHR	DIDSPC	Didymochrysis sp.		OVO	L	W		
CHL	DIDANOM	Didymogenes anomala	(G. M. Sm.) Hind.	FUS	L	W		
CHL	DIDPALA	Didymogenes palatina	Schmidle	FUS	L	W		
CHL	DIDSPG	Didymogense sp.		OVO	L	W		
CHL	DIMLUNA	Dimorphococcus lunatus	A. Braun.	OVO	L	W		
CHL	DIMSP	Dimorphococcus sp.		OVO	L	W		
CHR	DINACUM	Dinobryon acuminatum	Rutt.	OVO	L	W		
CHR	DINBALT	Dinobryon balticum	(Schutt) Lemm.	OVO	L	W		
CHR	DINBAVA	Dinobryon bavaricum	Imhof	OVO	L	W		
CHR	DINBAVAM	Dinobryon bavaricum var. medium	(Lemm.) Krieg.	OVO	L	W		
CHR	DINBAVAV	Dinobryon bavaricum var. vanhoeffenii	(Bachm.) Krieg.	OVO	L	W		
CHR	DINBORG	Dinobryon borgei	Lemm.	OVO	L	W		
CHR	DINCALC	Dinobryon calciformis	Bachm.	OVO	L	W		
CHR	DINCOND	Dinobryon condensatum var. planktonicum	Skuja	OVO	L	W		
CHR	DINCREN	Dinobryon crenulatum	West & West	OVO	L	W		
CHR	DINCYLI	Dinobryon cylindricum	Imhof	OVO	L	W		
CHR	DINCYLIA	Dinobryon cylindricum var. alpinum	(Imhof) Bachm.	OVO	L	W		
CHR	DINCYLIP	Dinobryon cylindricum var. palustre	Lemm.	OVO	L	W		
CHR	DINDIVE	Dinobryon divergens	Imhof	OVO	L	W		
CHR	DINDIVES	Dinobryon divergens var. schauinslandii	(Lemm.) Brunnth.	OVO	L	W		
CHR	DINEURY	Dinobryon eurystoma	(Stokes) Lemm.	OVO	L	W		
CHR	DINSERT	Dinobryon sertularia	Ehr.	OVO	L	W		
CHR	DINSERTP	Dinobryon sertularia var. protuberans	(Lemm.) Kreig.	OVO	L	W		
CHR	DINSOCI	Dinobryon sociale	Ehr.	OVO	L	W		
CHR	DINSOCIA	Dinobryon sociale var. americanum	(Brunnth.) Bachm.	OVO	L	W		
CHR	DINSOCIS	Dinobryon sociale var. stipitatum	(Stein) Lemm.	OVO	L	W		
CHR	DINSP	Dinobryon sp.		OVO	L	W		
CHR	DINSP1	Dinobryon sp. #1		OVO	L	W		
CHR	DINSTOK	Dinobryon stokesii	Lemm.	OVO	L	W		
CHR	DINSTOKE	Dinobryon stokesii var. epiplanktonicum	Skuja	OVO	L	W		
CHR	DINTUBA	Dinobryon tubaeformae	Nyg.	OVO	L	W		
CHR	DINUTRI	Dinobryon utriculus	Stein	OVO	L	W		
CHR	DINUTRIA	Dinobryon utriculus var. acutum	Shil.	OVO	L	W		
CHR	DINUTRIT	Dinobryon utriculus var. tabellariae	Lemm.	OVO	L	W		
CHL	DIPDECU	Diplochloris decussata	Kors.	FUS	L	W		
CHL	DIPLUNA	Diplochloris lunata	((Fott) Fott	FUS	L	W		
BAP	DIPBOLD	Diploneis boldtiana	Cl.	OVB	L	W	DP	
BAP	DIPELLI	Diploneis elliptica	(Kutz.) Cl.	OVB	L	W	DP	
BAP	DIPOBLO	Diploneis oblongella	(Nag. ex Kutz.) Ross	OVB	L	W	DP	
BAP	DIPOCUL	Diploneis oculata	(Breb.) Cl.	OVB	L	W	DP	
BAP	DIPOVAL	Diploneis ovalis	(Hilse) Cl.	OVB	L	W	DP	
BAP	DIPOVALB	Diploneis ovalis var oblongella	(Nag.) Cl.	OVB	L	W	DP	

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BAP	DIPPARM	Diploneis parma	Cl.	OVB	L	W	DP	
BAP	DIPPSEU	Diploneis pseudovalis	Hust.	OVB	L	W	DP	
BAP	DIPPUEL	Diploneis puella	(Schum.) Cl.	OVB	L	W	DP	
BAP	DIPSPE	Diploneis sp.		OVB	L	W	DP	
CHR	DIPSP1	Diplosiga sp.		OVO	L	W		
CHL	ECHSPC	Echinocoleum sp.		OVO	L	W		
CHL	ECHLIMN	Echnosphaerella limnetica	G.M. Sm.	SPH				D
CHL	ECHSPS	Echnosphaeridium sp.		SPH				D
CHL	ELAGENE	Elakatothrix genevensis	(Rev.) Hind.	FUS	L	W		
CHL	ELASP	Elakatothrix sp.		FUS	L	W		
CHL	ELAVIRI	Elakatothrix viridis	(Snow) Printz	FUS	L	W		
CHL	ENACOEL	Enallax coelastroides	(Bohl.) Skuja	OVO	L	W		
BAP	ENTORNA	Entomoneis ornata	(J.W. Bail.) Reim. in Patr. & Reim.	OVB	L	W	DP	
BAP	ENTSP	Entomoneis sp.		OVB	L	W	DP	
CHR	EPISP	Epipyxis sp.		OVO	L	W		
BAP	EPISPX	Epithemia sp.		OVB	L	W	DP	
CHL	EUDELEG	Eudorina elegans	Ehr.	OVO	L	W		
CHL	EUDSP	Eudorina sp.		OVO	L	W		
EUG	EUGSP	Euglena sp.		OVO	L	W		
EUG	EUGSP1	Euglena sp. #1		OVO	L	W		
EUG	EUGSP2	Euglena sp. #2		OVO	L	W		
BAP	EUNCURV	Eunotia curvata	(Kutz.) Lagerst.	DMB	L	W	DP	
BAP	EUNINCI	Eunotia incisa	W. Sm.	DMB	L	W	DP	
BAP	EUNPECT	Eunotia pectinalis	(O. F. Mull.) Rabh.	DMB	L	W	DP	
BAP	EUNPRAE	Eunotia praerupta	Ehr.	DMB	L	W	DP	
BAP	EUNSP	Eunotia sp.		DMB	L	W	DP	
CHL	EUTSPC	Eutetramorus sp.		SPH				D
EUG	EUTSPO	Eutreptia sp.		OVO	L	W		
BAP	FRABREV	Fragilaria brevistriata	Grun.	DMB	L	W	DP	
BAP	FRABREVI	Fragilaria brevistriata var. inflata	(Pant.) Hust.	DMB	L	W	DP	
BAP	FRABREVS	Fragilaria brevistriata var. subcapitata	Grun.	DMB	L	W	DP	
BAP	FRACAPU	Fragilaria capucina	Desm.	DMB	L	W	DP	
BAP	FRACAPUL	Fragilaria capucina var. lanceolata	Grun.	DMB	L	W	DP	
BAP	FRACAPUM	Fragilaria capucina var. mesolepta	(Rabh.) Grun.	DMB	L	W	DP	
BAP	FRACONS	Fragilaria construens	(Ehr.) Grun.	DMB	L	W	DP	
BAP	FRACONSB	Fragilaria construens var. binodis	(Ehr.) Grun.	DMB	L	W	DP	
BAP	FRACONSM	Fragilaria construens var. minuta	Temp. & Perag.	DMB	L	W	DP	
BAP	FRACONSP	Fragilaria construens var. pumila	Grun.	DMB	L	W	DP	
BAP	FRACONSS	Fragilaria construens var. subsalina	Hust.	DMB	L	W	DP	
BAP	FRACONSV	Fragilaria construens var. venter	(Ehr.) Grun.	DMB	L	W	DP	
BAP	FRACROT	Fragilaria crotonensis	Kitton	DMB	L	W	DP	
BAP	FRACROTO	Fragilaria crotonensis var. oregonia	Sov.	DMB	L	W	DP	
BAP	FRAINTE	Fragilaria intermedia	Grun.	DMB	L	W	DP	
BAP	FRAINTEF	Fragilaria intermedia var. fallax	(Grun.) Stoerm. & Yang	DMB	L	W	DP	
BAP	FRALAPP	Fragilaria lapponica	Grun.	OVB	L	W	DP	
BAP	FRALEPT	Fragilaria leptostauron	(Ehr.) Hust.	DMB	L	W	DP	
BAP	FRALEPT?	Fragilaria leptostauron var. (?)		DMB	L	W	DP	
BAP	FRALEPTD	Fragilaria leptostauron var. dubia	(Grun.) Hust.	DMB	L	W	DP	
BAP	FRALEPTR	Fragilaria leptostauron var. rhomboides	Grun.	DMB	L	W	DP	
BAP	FRANITZ	Fragilaria nitzschiooides	Grun.	DMB	L	W	DP	
BAP	FRAPINN	Fragilaria pinnata	Ehr.	OVB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	FRAPINNI	<i>Fragilaria pinnata</i> var. <i>intercedens</i>	(Grun.) Hust.	OVB	L	W	DP	
BAP	FRAPINNL	<i>Fragilaria pinnata</i> var. <i>lancettula</i>	(Schum.) Hust.	DMB	L	W	DP	
BAP	FRAPINNV	<i>Fragilaria pinnata</i> var. <i>venter</i>	(Ehr.) Grun.	OVB	L	W	DP	
BAP	FRASPC	<i>Fragilaria</i> sp.		DMB	L	W	DP	
BAP	FRASP1	<i>Fragilaria</i> sp. # 1		DMB	L	W	DP	
BAP	FRASP2	<i>Fragilaria</i> sp. # 2		DMB	L	W	DP	
BAP	FRASP3	<i>Fragilaria</i> sp. # 3		DMB	L	W	DP	
BAP	FRASP4	<i>Fragilaria</i> sp. #4		DMB	L	W	DP	
BAP	FRAVAUC	<i>Fragilaria vaucheriae</i>	(Kutz.) Peters.	DMB	L	W	DP	
BAP	FRAVAUC1	<i>Fragilaria vaucheriae</i> var. #1		DMB	L	W	DP	
BAP	FRAVAUCC	<i>Fragilaria vaucheriae</i> var. <i>capitellata</i>	(Grun.) Patr.	DMB	L	W	DP	
BAP	FRAVIRE	<i>Fragilaria virescens</i>	Ralfs	DMB	L	W	DP	
BAP	FRAVIRES	<i>Fragilaria virescens</i> var. <i>subsalina</i>	Grun.	OVB	L	W	DP	
CHL	FRADROE	<i>Franceia droescheri</i>	(Lemm.) G.M. Sm.	OVO	L	W		
CHL	FRAELON	<i>Franceia elongata</i>	Kors.	OVO	L	W		
CHL	FRAMINU	<i>Franceia minuscula</i>	Hind.	OVO	L	W		
CHL	FRAOVAL	<i>Franceia ovalis</i>	(France) Lemm.	OVO	L	W		
CHL	FRASPB	<i>Franceia</i> sp.		OVO	L	W		
		<i>Frustulia rhomboides</i> var. <i>amphibleurooides</i>						
BAP	FRURHOMA		(Grun.) Cl.	DMB	L	W	DP	
BAP	FRURHOMS	<i>Frustulia rhomboides</i> var. <i>saxonica</i>	(Rabh.) DeT.	DMB	L	W	DP	
BAP	FRUVULG	<i>Frustulia vulgaris</i>	(Thw.) DeT.	DMB	L	W	DP	
CHL	FUSBICE	<i>Fusiform bicells</i>		FUS	L	W		
PYR	GLEALPE	<i>Glenodinium alpestre</i>	(?) Chod.	OVO	L	W		
PYR	GLESP	<i>Glenodinium</i> sp.		OVO	L	W		
CHL	GLOLIMN	<i>Gloeactinium limneticum</i>	G.M. Sm.	OVO	L	W		
CHL	GLOBACI	<i>Gloeocystis bacillus</i>	(Teil.) Fott	OVO	L	W		
CHL	GLOGIGA	<i>Gloeocystis gigas</i>	(Kutz.) Lag.	OVO	L	W		
CHL	GLOPLAN	<i>Gloeocystis planktonica</i>	(W. & G.S. West) Lemm.	OVO	L	W		
CHL	GLOSPC	<i>Gloeocystis</i> sp.		OVO	L	W		
CHL	GLOSP1	<i>Gloeocystis</i> sp. #1		OVO	L	W		
CHL	GLOSP2	<i>Gloeocystis</i> sp. #2		OVO	L	W		
CHL	GLOSP3	<i>Gloeocystis</i> sp. #3		OVO	L	W		
CHL	GLOPOVO	<i>Gloeocystis</i> sp. (ovoid)		OVO	L	W		
CHL	GLOSPSPH	<i>Gloeocystis</i> sp. (sphere)		OVO	L	W		
CYA	GLORUPE	<i>Gloeothece rupestris</i>	(Lyngb.) Born.	OVO	L	W		
CHL	GLOSPT	<i>Gloeotila</i> sp.		CYL	L	W	DP	D
CHL	GOLMAXI	<i>Golenkinia maxima</i>	Tiff. & Ahlstr.	SPH				D
CHL	GOLRADI	<i>Golenkinia radiata</i>	(Chod.) Wille	SPH				D
CHL	GOLRADIB	<i>Golenkinia radiata</i> var. <i>brevispina</i>	Tiff. & Ahlstr.	SPH				D
CHL	GOLSPK	<i>Golenkinia</i> sp.		SPH				D
CHL	GOLSP1A	<i>Golenkinia</i> sp. #1		SPH				D
CHL	GOLSPI	<i>Golenkiniopsis</i> sp.		SPH				D
CHL	GOLSP1O	<i>Golenkiniopsis</i> sp. #1		SPH				D
BAP	GOMACUM	<i>Gomphonema acuminatum</i>	Ehr.	OVB	L	W	DP	
BAP	GOMAFFI	<i>Gomphonema affine</i>	Kutz.	OVB	L	W	DP	
BAP	GOMAFFII	<i>Gomphonema affine</i> var. <i>insigne</i>	(Greg.) Andrews	OVB	L	W	DP	
BAP	GOMANGU	<i>Gomphonema angustatum</i>	(Kutz.) Rabh.	OVB	L	W	DP	
BAP	GOMANGUP	<i>Gomphonema angustatum</i> var. <i>productum</i>	Grun.	OVB	L	W	DP	
BAP	GOMBRAZ	<i>Gomphonema brasiliense</i>	Grun.	OVB	L	W	DP	
BAP	GOMCLEV	<i>Gomphonema clevei</i>	Fricke	OVB	L	W	DP	
BAP	GOMDICH	<i>Gomphonema dichotomum</i>	Kutz.	OVB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	GOMGRAC	Gomphonema gracile	Ehr. emend. V.H.	OVB	L	W	DP	
BAP	GOMOLIV	Gomphonema olivaceum	(Lyngb.) Kutz.	OVB	L	W	DP	
BAP	GOMPARV	Gomphonema parvulum	(Kutz.) Kutz.	OVB	L	W	DP	
BAP	GOMSIMU	Gomphonema simus	Hohn & Hellerm	OVB	L	W	DP	
BAP	GOMSP	Gomphonema sp.		OVB	L	W	DP	
BAP	GOMSUBCM	Gomphonema subclavatum var. mexicanum	(Grun.) Patr.	OVB	L	W	DP	
BAP	GOMSUBT	Gomphonema subtile	Ehr.	OVB	L	W	DP	
BAP	GOMTENE	Gomphonema tenellum	Kutz.	OVB	L	W	DP	
BAP	GOMTERG	Gomphonema tergestinum	(Grun.) Fricke	OVB	L	W	DP	
BAP	GOMVENT	Gomphonema ventricosum	Greg.	OVB	L	W	DP	
CYA	GMAAPON	Gomphosphaeria aponina	Kutz.	OVO	L	W		
CYA	GMAAPVCO	Gomphosphaeria aponina var. cordiformis	Wolle	OVO	L	W		
CYA	GMAAPVDE	Gomphosphaeria aponina var. delicatula	Virieux	OVO	L	W		
CYA	GMALACU	Gomphosphaeria lacustris	Chod.	OVO	L	W		
CYA	GMALAVCO	Gomphosphaeria lacustris var. compacta	Lemm.	OVO	L	W		
CYA	GMASP	Gomphosphaeria naegelianum	Unger.	OVO	L	W		
CHL	GONPECT	Gonium pectorale	Mull.	OVO	L	W		
CHL	GONSP	Gonium sp.		OVO	L	W		
PYR	GYMEXCA	Gymnodinium excavatum	Nyg.	OVO	L	W		
PYR	GYMHELV	Gymnodinium helveticum	Pen.	OVO	L	W		
PYR	GYMHELVA	Gymnodinium helveticum f. achrourum	Skuja	OVO	L	W		
PYR	GYMPARA	Gymnodinium paradoxum	Schill.	OVO	L	W		
PYR	GYMSP	Gymnodinium sp.		OVO	L	W		
PYR	GYMSP1	Gymnodinium sp. #1		OVO	L	W		
PYR	GYMSP2	Gymnodinium sp. #2		OVO	L	W		
PYR	GYMSP3	Gymnodinium sp. #3		OVO	L	W		
PYR	GYMSP4	Gymnodinium sp. #4		OVO	L	W		
PYR	GYMSP5	Gymnodinium sp. #5		OVO	L	W		
CHL	GYRCORD	Gyromitus cordiformis	Skuja	CON	L	W		
BAP	GYRACUM	Gyrosigma acuminatum	(Kutz.) Rabh.	RTB	L	W	DP	
BAP	GYRATTE	Gyrosigma attenuatum	(Kutz.) Rabh.	RTB	L	W	DP	
BAP	GYRNODI	Gyrosigma nodiferum	(Grun.) Reim.	RTB	L	W	DP	
BAP	GYROBSC	Gyrosigma obscurum	(W. Sm.) Giff. & Henfr.	RTB	L	W	DP	
BAP	GYRSCAL	Gyrosigma scalpoides	(Rabh.) Cl.	RTB	L	W	DP	
BAP	GYRSCIO	Gyrosigma sciotense	(Sulliv. & Wormley) Cl.	RTB	L	W	DP	
BAP	GYRSP	Gyrosigma sp.		RTB	L	W	DP	
BAP	GYRSPEN	Gyrosigma spencerii	Quek.	RTB	L	W	DP	
BAP	GYRSPENC	Gyrosigma spencerii var. curvula	(Grun.) Reim.	RTB	L	W	DP	
BAP	HANARCU	Hannaea arcus	(Ehr.) Patr.	OVB	L	W	DP	
BAP	HANAMPH	Hantzschia amphioxys	(Ehr.) Grun.	OVB	L	W	DP	
BAP	HANAMPHC	Hantzschia amphioxys f. capitata	O. Mull.	OV	L	W	DP	
CHR	HAPSP	Haptophyceae		OVO	L	W		
PYR	HEMNASU	Hemidinium nasutum	Stein (?)	OVO	L	W		
PYR	HEMSP	Hemidinium sp.		OVO	L	W		
CHL	HETGALL	Heterodesmus gallicus	Bourr. & Coute	FUS	L	W		
CHR	HYASP	Hyalobryon sp.		OVO	L	W		
CHR	HYASP1	Hyalobryon sp. #1		OVO	L	W		
XAN	ISTTRIS	Isthmochloron trispinatum	(West & West) Skuja	OVO	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHR	KEPASPE	Kephyrion asper	(Lack.) Bourr.	OVO	L	W		
CHR	KEPBORE	Kephyrion boreale	Skuja	OVO	L	W		
CHR	KEPCINC	Kephyrion cinctum	(Lemm.) Bourr.	OVO	L	W		
CHR	KEPCUPU	Kephyrion cupuliformae	Conn.	OVO	L	W		
CHR	KEPCYLI	Kephyrion cylindricum	(Lack.) Conn.	OVO	L	W		
CHR	KEPDOLI	Kephyrion dololum	Conn.	OVO	L	W		
CHR	KEPHEMI	Kephyrion hemisphaericum	(Lack.) Conn.	OVO	L	W		
CHR	KEPHILL	Kephyrion hilliardii	Nich. (?)	OVO	L	W		
CHR	KEPLITT	Kephyrion littorale	Lund	OVO	L	W		
CHR	KEPMAST	Kephyrion mastigophorum	G.Schm.	OVO	L	W		
CHR	KEPOVAL	Kephyrion ovale	(Lack.) Huber-Pest.	OVO	L	W		
CHR	KEPPRIS	Kephyrion prismaticum	Conn.	OVO	L	W		
CHR	KEPRUBR	Kephyrion rubri-claustri	Conn.	OVO	L	W		
CHR	KEPRUBRA	Kephyrion rubri-claustri var. amphora	(Lack.) Conn.	OVO	L	W		
CHR	KEPSP	Kephyrion sp.		OVO	L	W		
CHR	KEPSP1	Kephyrion sp. #1		OVO	L	W		
CHR	KEPSP2	Kephyrion sp. #2		OVO	L	W		
CHR	KEPSP3	Kephyrion sp. #3		OVO	L	W		
CHR	KEPSPIR	Kephyrion spirale	(Lack.) Conn.	OVO	L	W		
CHL	KIRCONT	Kirchneriella contorta	(Schm.) Bohlin	FUS	L	W		
CHL	KIRELON	Kirchneriella elongata	G.M. Sm.	FUS	L	W		
CHL	KIRLUNA	Kirchneriella lunaris	(Kirch.) Moeb	FUS	L	W		
CHL	KIRMAYO	Kirchneriella mayori	(G. S. West) Kom.-Legn. in Kom.	FUS	L	W		
CHL	KIROBES	Kirchneriella obesa	(W. West) Schm.	FUS	L	W		
CHL	KIROBESM	Kirchneriella obesa var. major	(Bern.) G.M. Sm.	FUS	L	W		
CHL	KIRSP	Kirchneriella sp.		FUS	L	W		
CHL	KIRSUBS	Kirchneriella subsolitaria	G. S. West	FUS	L	W		
CHL	KORLIMN	Korshikoviella limnetica	(Lemm.) Silva	FUS	L	W		
CHR	LAGGLOB	Lagenoeca globulosa	France	OVO	L	W		
CHR	LAGOVAT	Lagenoeca ovata	Lemm. (?)	OVO	L	W		
CHL	LAGBALA	Lagerheimia balatonica	(Scherff.in Kol) Hind.	OVO	L	W		
CHL	LAGCHOD	Lagerheimia chodatii	Bern.	OVO	L	W		
CHL	LAGCILI	Lagerheimia ciliata	(Lag.) Chod.	OVO	L	W		
CHL	LAGCING	Lagerheimia cingula	G.M. Sm.	OVO	L	W		
CHL	LAGCITR	Lagerheimia citriformis	(Snow) G.M. Sm.	OVO	L	W		
CHL	LAGCITRP	Lagerheimia citriformis var. paucispina	Tiff. & Ahlstr.	OVO	L	W		
CHL	LAGGENE	Lagerheimia genevensis	(Chod.) Wille	OVO	L	W		
CHL	LAGLONG	Lagerheimia longiseta	(Lemm.) Printz	OVO	L	W		
CHL	LAGLONGM	Lagerheimia longiseta var. major	G.M. Sm.	OVO	L	W		
CHL	LAGQUAD	Lagerheimia quadriseta	(Lemm.) G.M. Sm.	OVO	L	W		
CHL	LAGSPL	Lagerheimia sp.		OVO	L	W		
CHL	LAGSUBS	Lagerheimia subsalsa	Lemm.	OVO	L	W		
CHL	LAGWRAT	Lagerheimia wratislaviensis	Schröd.	OVO	L	W		
CHR	LAGSPR	Lagynion sp.		OVO	L	W		
CHL	LOBSPC	Lobocystis sp.		OVO	L	W		
CHL	LOBAMPLO	Lobomonas ampla var. okensis	Kor.	OVO	L	W		
CHL	LOBSPM	Lobomonas sp.		OVO	L	W		
CHR	LOROVOID	Lorate ovoid		OVO	L	W		
CHR	LOROVOIF	Lorate ovoid-flagellates		OVO	L	W		
CHR	LORSPHEE	Lorate spheres		SPH			D	
CHR	LORSPHEI	Lorate spherical flagellates		SPH			D	
CYA	LYNBIRG	Lyngbya birgei	G.M. Sm.	CYL	L	W	DP	D

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CYA	LYNLAGE	<i>Lyngbya lagerheimii</i>	(Moeb.) Gom.	CYL	L	W	DP	D
CYA	LYNLIMN	<i>Lyngbya limneticum</i>	Lemm.	CYL	L	W	DP	D
CYA	LYNSP1	<i>Lyngbya</i> sp. #1		CYL	L	W	DP	D
CYA	LYNSPIR	<i>Lyngbya spirulinoidea</i>	Gom.	CYL	L	W	DP	D
CHR	MALACAR	<i>Mallomonas acaroides</i>	Perty (?)	OVO	L	W		
CHR	MALAKRO	<i>Mallomonas akrokomos</i>	Ruttn.	OVO	L	W		
CHR	MALALLO	<i>Mallomonas allorgei</i>	(Defl.) Conr.	OVO	L	W		
CHR	MALCAUD	<i>Mallomonas caudata</i>	Iwanoff (?)	OVO	L	W		
CHR	MALMAJO	<i>Mallomonas majorensis</i>	Skuja	OVO	L	W		
CHR	MALPSEU	<i>Mallomonas pseudocoronata</i>	Presc.	OVO	L	W		
CHR	MALRADI	<i>Mallomonas radiata</i>	Conr.	OVO	L	W		
CHR	MALSP	<i>Mallomonas</i> sp.		OVO	L	W		
CHR	MALSP1	<i>Mallomonas</i> sp. #1		OVO	L	W		
CHR	MALSP2	<i>Mallomonas</i> sp. #2		OVO	L	W		
CHR	MALSP3	<i>Mallomonas</i> sp. #3		OVO	L	W		
CHR	MALSP4	<i>Mallomonas</i> sp. #4		OVO	L	W		
CHR	MALTONSA	<i>Mallomonas tonsurata</i> var. <i>alpina</i>	(Pasch. & Rutt.) Krieg. (?)	OVO	L	W		
CHR	MALVALK	<i>Mallomonas valkanoviana</i>	Conr.	OVO	L	W		
CHR	MASSP	<i>Mastigella</i> sp.		OVO	L	W		
BAC	AULLIALP	<i>Melosira distans</i> var. <i>alpigena</i>	Grun.	CYL	L	W	DP	D
BAC	AULSUBAR	<i>Melosira italicica</i> subsp. <i>subarctica</i>	O. Mull.	CYL	L	W	DP	D
BAC	AULEPIDE	<i>Melosira roseana</i>	Rabh.	CYL	L	W	DP	D
BAC	MELSP	<i>Melosira</i> sp.		CYL	L	W	DP	D
BAC	MELUNDU	<i>Melosira undulata</i>	(Ehr.) Kutz.	CYL	L	W	DP	D
BAC	MELVARI	<i>Melosira varians</i>	Ag.	CYL	L	W	DP	D
BAP	MERCIRC	<i>Meridion circulare</i>	(Grev.) Ag.	OVB	L	W	DP	
BAP	MERCIRCC	<i>Meridion circulare</i> var. <i>constrictum</i>	(Ralfs) V.H.	OV	L	W	DP	
CYA	MERCONV	<i>Merismopedia convoluta</i>	Breb. in Kutz.	OVO	L	W		
CYA	MERTENU	<i>Merismopedia tenuissima</i>	Lemm.	SPH				D
CHL	MITBORN	<i>Micractinium bornheimiense</i>	(Cour.) Kors.	OVO	L	W		
CHL	MITPUSI	<i>Micractinium pusillum</i>	Fres.	OVO	L	W		
CHL	MITQUAD	<i>Micractinium quadrisetum</i>	(Lemm.) G.M. Sm.	OVO	L	W		
CHL	MITSP1	<i>Micractinium</i> sp. #1		OVO	L	W		
CYA	ANAMONT	<i>Microcystis elachista</i>	(West & West) Star.	SPH				D
CYA	MICSPA	<i>Microcystis</i> sp.		OVO	L	W		
CHL	MPASPA	<i>Microspora</i> sp.		CYL	L	W	DP	D
CHL	MONARCU	<i>Monoraphidium arcuatum</i>	Kors.	FUS	L	W		
CHL	MONBRAU	<i>Monoraphidium braunii</i>	(Nag. in Kutz.) Kom.-Legn.	FUS	L	W		
CHL	MONCIRC	<i>Monoraphidium circinale</i>	(Nyg.) Nyg.	FUS	L	W		
CHL	MONCONT	<i>Monoraphidium contortum</i>	(Thuret in Breb.) Kom.-Legn.	FUS	L	W		
CHL	MONCONV	<i>Monoraphidium convolutum</i>	(Corda) Kom.-Legn.	FUS	L	W		
CHL	MONDYBO	<i>Monoraphidium dybowskii</i>	(Wolosz.) Hindak et Kom.-Legn.	FUS	L	W		
CHL	MONGRIF	<i>Monoraphidium griffithii</i>	(Berkel) Kom.-Legn.	FUS	L	W		
CHL	MONIRRE	<i>Monoraphidium irregularare</i>	(G.M. Sm.) Kom.-Legn.	FUS	L	W		
CHL	MONMINU	<i>Monoraphidium minutum</i>	(Nag.) Kom.-Legn.	FUS	L	W		
CHL	MONOBTU	<i>Monoraphidium obtusum</i>	(Kors.) Kom.-Legn.	FUS	L	W		
CHL	MONPUSI	<i>Monoraphidium pusillum</i>	(Printz) Kom.-Legn.	FUS	L	W		
CHL	MONSAXA	<i>Monoraphidium saxatile</i>	Kom.-Legn.	FUS	L	W		
CHL	MONSETI	<i>Monoraphidium setiforme</i>	(Nyg.) Kom.-Legn.	FUS	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	MONSKUJ	Monoraphidium skujae	Fott	FUS	L	W		
CHL	MONSPH	Monoraphidium sp.		FUS	L	W		
CHL	MONSP1	Monoraphidium sp. #1		FUS	L	W		
CHL	MONTORT	Monoraphidium tortile	(W. & G.S. West) Kom.-Legn.	FUS	L	W		
CHR	MONOVAT	Monosiga ovata	Kent	OVO	L	W		
CHR	MONSPO	Monosiga sp.		OVO	L	W		
CHL	MOUSP	Mougeotia sp.		CYL	L	W	DP	D
BAP	NAVACCE	Navicula acceptata	Hust.	OVB	L	W	DP	
BAP	NAVANGL	Navicula anglica	Ralfs	OVB	L	W	DP	
BAP	NAVANGLI	Navicula anglica var. signata	Hust.	OVB	L	W	DP	
BAP	NAVANGLU	Navicula anglica var. subsalsa	(Grun.) Cl.	OVB	L	W	DP	
BAP	NAVARVE	Navicula arvensis	Hust.	OVB	L	W	DP	
BAP	NAVATOM	Navicula atomus	(Kutz.) Grun.	OVB	L	W	DP	
BAP	NAVAURO	Navicula aurora	Sov.	OVB	L	W	DP	
BAP	NAVBCACI	Navicula bacillum	Ehr.	OVB	L	W	DP	
BAP	NAVCAPCI	Navicula capitata	Ehr.	DMB	L	W	DP	
BAP	NAVCAPIH	Navicula capitata var. hungarica	(Grun.) Ross	DMB	L	W	DP	
BAP	NAVCAPIL	Navicula capitata var. luneburgensis	(Grun.) Patr.	DMB	L	W	DP	
BAP	NAVCINC	Navicula cincta	(Ehr.) Ralfs	OVB	L	W	DP	
BAP	NAVCITR	Navicula citrus	Krasske	OVB	L	W	DP	
BAP	NAVCLEM	Navicula clementis var. (?)		OVB	L	W	DP	
BAP	NAVCOC	Navicula coccineiformis	Greg. ex Grev.	OVB	L	W	DP	
BAP	NAVCONF	Navicula confervacea	Kutz.	OVB	L	W	DP	
BAP	NAVCONTB	Navicula contenta var. biceps	(Arn.) V.H.	OVB	L	W	DP	
BAP	NAVCO	Navicula costulata	Grun. in Cl. & Grun.	OVB	L	W	DP	
BAP	NAVCRYP	Navicula cryptocephala	Kutz.	DMB	L	W	DP	
BAP	NAVCRYP?	Navicula cryptocephala var. (?)		DMB	L	W	DP	
BAP	NAVCRYPV	Navicula cryptocephala var. veneta	(Kutz.) Rabh.	OVB	L	W	DP	
BAP	NAVCUSP	Navicula cuspidata	(Kutz.) Kutz.	DMB	L	W	DP	
BAP	NAVDECU	Navicula decussis	Ostr.	DMB	L	W	DP	
BAP	NAVDETE	Navicula detenta	Hust.	OVB	L	W	DP	
BAP	NAVDISJ	Navicula disjuncta	Hust. (?)	OVB	L	W	DP	
BAP	NAVELGIL	Navicula elginensis var. lata	(M. Perag.) Patr.	OVB	L	W	DP	
BAP	NAVEXIG	Navicula exigua	Greg. ex Grun.	OVB	L	W	DP	
BAP	NAVEXIGC	Navicula exigua var. capitata	Patr.	OVB	L	W	DP	
BAP	NAVEXPL	Navicula explanata	Hust.	OVB	L	W	DP	
BAP	NAVFART	Navicula farta	Hust.	OVB	L	W	DP	
BAP	NAVFOSS	Navicula fossilis	Krasske	OVB	L	W	DP	
BAP	NAVFRAC	Navicula fracta	Hust.	OVB	L	W	DP	
BAP	NAVFRUG	Navicula frugalis	Hust.	OVB	L	W	DP	
BAP	NAVGAST	Navicula gastrum	(Ehr.) Kutz.	OVB	L	W	DP	
BAP	NAVGASTS	Navicula gastrum var. signata	Hust.	OVB	L	W	DP	
BAP	NAVGOTT	Navicula gottlandica	Grun.	OVB	L	W	DP	
BAP	NAVGRACI	Navicula gracilis	Ehr.	DMB	L	W	DP	
BAP	NAVGRACO	Navicula graciloides	A. Mayer sensu Hust.	DMB	L	W	DP	
BAP	NAVREG	Navicula gregaria	Donk.	DMB	L	W	DP	
BAP	NAVHAMB	Navicula hambergii	Hust.	OVB	L	W	DP	
BAP	NAVHARD	Navicula harderi	Hust.	OVB	L	W	DP	
BAP	NAVHASS	Navicula hassiaca	Krasske	OVB	L	W	DP	
BAP	NAVHELE	Navicula helensis	Schutz	OVB	L	W	DP	
BAP	NAVIMBR	Navicula imbricata	Bock	OVB	L	W	DP	
BAP	NAVINGR	Navicula ingrata	Krasske	OVB	L	W	DP	

**Sampling and Analytical Procedures  
for GLNPO's WQS**

DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	NAVINTE	Navicula integra	(W. Sm.) Ralfs	OVB	L	W	DP	
BAP	NAVJAER	Navicula jaernefeltii	Hust.	OVB	L	W	DP	
BAP	NAVLACU	Navicula lacustris	Greg.	OVB	L	W	DP	
BAP	NAVLAEV	Navicula laevissima	Kutz.	OVB	L	W	DP	
BAP	NAVLANC	Navicula lanceolata	(Ag.) Kutz.	DMB	L	W	DP	
BAP	NAVIVATE	Navicula latens	Krasske	OVB	L	W	DP	
BAP	NAVIMEDI	Navicula mediocris	Krasske	OVB	L	W	DP	
BAP	NAVMENTI	Navicula menisculus	Schum.	DMB	L	W	DP	
BAP	NAVMENTIU	Navicula menisculus var. upsaliensis	(Grun.) Grun.	DMB	L	W	DP	
BAP	NAVMINI	Navicula minima	Grun.	OVB	L	W	DP	
BAP	NAVMINU	Navicula minuscula	Grun.	OVB	L	W	DP	
BAP	NAVMINUM	Navicula minuscula var. muralis	(Grun.) Lange-Bert.	OVB	L	W	DP	
BAP	NAVMURAF	Navicula muraliformis	Hust.	OVB	L	W	DP	
BAP	NAVMURAS	Navicula muralis	Grun.	OVB	L	W	DP	
BAP	NAVMUTI	Navicula mutica	Kutz.	OVB	L	W	DP	
BAP	NAVMUTIC	Navicula mutica var. cohnii	(Hilse) Grun.	OVB	L	W	DP	
BAP	NAVMUTIU	Navicula mutica var. undulata	(Hilse) Grun.	OVB	L	W	DP	
BAP	NAVOCHR	Navicula ochridana	Hust.	OVB	L	W	DP	
BAP	NAVODIO	Navicula odiosa	Wallace	DMB	L	W	DP	
BAP	NAVOMIS	Navicula omissa	Hust.	OVB	L	W	DP	
BAP	NAVPAUC	Navicula paucivisitata	Patr.	OVB	L	W	DP	
BAP	NAVPELL	Navicula pelliculosa	Hilse	OVB	L	W	DP	
BAP	NAVPERP	Navicula perpusilla	(Kutz.) Grun.	OVB	L	W	DP	
BAP	NAVPHYL	Navicula phyllepta	Kutz.	OVB	L	W	DP	
BAP	NAVPLAC	Navicula placentula	(Ehr.) Kutz.	OVB	L	W	DP	
BAP	NAVPLAT	Navicula platysoma	Ehr.	OVB	L	W	DP	
BAP	NAVPLATP	Navicula platysoma var. pantocseki	Wis. & Kolbe	OVB	L	W	DP	
BAP	NAVPORI	Navicula porifera	Hust.	OVB	L	W	DP	
BAP	NAVPROT	Navicula protracta	Grun.	OVB	L	W	DP	
BAP	NAVPSEUL	Navicula pseudolanceolata	Lange-Bert.	OVB	L	W	DP	
BAP	NAVPSEUM	Navicula pseudomuralis	Hust. (?)	OVB	L	W	DP	
BAP	NAVPSEUR	Navicula pseudoreinhardtii	Patr.	DMB	L	W	DP	
BAP	NAVPSEUS	Navicula pseudoscutiformis	Hust.	OVB	L	W	DP	
BAP	NAVPSEUY	Navicula pseudoventralis	Hust.	OVB	L	W	DP	
BAP	NAVPUPU	Navicula pupula	Kutz.	OVB	L	W	DP	
BAP	NAVPUPUE	Navicula pupula f. elliptica	Hust.	OVB	L	W	DP	
BAP	NAVPUPUC	Navicula pupula var. capitata	Hust.	OVB	L	W	DP	
BAP	NAVPUPUM	Navicula pupula var. mutata	(Krasske) Hust.	OVB	L	W	DP	
BAP	NAVRADI	Navicula radiosa	Kutz.	DMB	L	W	DP	
BAP	NAVRADI?	Navicula radiosa var. (?)		DMB	L	W	DP	
BAP	NAVRADIP	Navicula radiosa var. parva	Wallace	DMB	L	W	DP	
BAP	NAVRADIT	Navicula radiosa var. tenella	(Breb.) Cl. & Moll.	DMB	L	W	DP	
BAP	NAVREIN	Navicula reinhardtii	Grun.	OVB	L	W	DP	
BAP	NAVREINE	Navicula reinhardtii var. elliptica	Herib.	OVB	L	W	DP	
BAP	NAVRHYN	Navicula rhynchocephala	Kutz.	OVB	L	W	DP	
BAP	NAVRHYNA	Navicula rhynchocephala var. amphiceros	(Kutz.) Grun.	OVB	L	W	DP	
BAP	NAVSALI	Navicula salinarum	Grun.	OVB	L	W	DP	
BAP	NAVSALII	Navicula salinarum var. intermedia	(Grun.) Cl.	OVB	L	W	DP	
BAP	NAVSAXO	Navicula saxophila	Bock	OVB	L	W	DP	
BAP	NAVSCHO	Navicula schoenfeldii	Hust.	OVB	L	W	DP	
BAP	NAVSCUT	Navicula scutelloides	W. Sm.	OVB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	NAVSEMIO	Navicula seminuloides	Hust.	OVB	L	W	DP	
BAP	NAVSEMIU	Navicula seminulum	Grun.	OVB	L	W	DP	
BAP	NAVSIMI	Navicula similis	Krasske emend. Hust.	OVB	L	W	DP	
BAP	NAVSP	Navicula sp.		OVB	L	W	DP	
BAP	NAVSP1	Navicula sp. #1		OVB	L	W	DP	
BAP	NAVSP10	Navicula sp. #10		DMB	L	W	DP	
BAP	NAVSP11	Navicula sp. #11		DMB	L	W	DP	
BAP	NAVSP12	Navicula sp. #12		DMB	L	W	DP	
BAP	NAVSP15	Navicula sp. #15		OVB	L	W	DP	
BAP	NAVSP16	Navicula sp. #16		OVB	L	W	DP	
BAP	NAVSP17	Navicula sp. #17		OVB	L	W	DP	
BAP	NAVSP18	Navicula sp. #18		OVB	L	W	DP	
BAP	NAVSP19	Navicula sp. #19		OVB	L	W	DP	
BAP	NAVSP3	Navicula sp. #3		OVB	L	W	DP	
BAP	NAVSP4	Navicula sp. #4		DMB	L	W	DP	
BAP	NAVSP5	Navicula sp. #5		OVB	L	W	DP	
BAP	NAVSP6	Navicula sp. #6		OVB	L	W	DP	
BAP	NAVSP7	Navicula sp. #7		OVB	L	W	DP	
BAP	NAVSP8	Navicula sp. #8		OVB	L	W	DP	
BAP	NAVSP9	Navicula sp. #9		OVB	L	W	DP	
BAP	NAVSP?	Navicula sp. A		OVB	L	W	DP	
BAP	NAVSPLE	Navicula splendicula	VanLand.	DMB	L	W	DP	
BAP	NAVSTRO	Navicula stroemii	Hust.	OVB	L	W	DP	
BAP	NAVSUBH	Navicula subhamulata	Grun.	OVB	L	W	DP	
BAP	NAVSUBHU	Navicula subhamulata var. undulata	Hust.	OVB	L	W	DP	
BAP	NAVSUBMI	Navicula submittis	Hust.	OVB	L	W	DP	
BAP	NAVSUBMU	Navicula submuralis	Hust.	OVB	L	W	DP	
BAP	NAVSUBO	Navicula subocculata	Hust.	OVB	L	W	DP	
BAP	NAVSUBR	Navicula subrotundata	Hust.	OVB	L	W	DP	
BAP	NAVSUBT	Navicula subtilissima	Cl.	OVB	L	W	DP	
BAP	NAVTANT	Navicula tantula	Hust.	OVB	L	W	DP	
BAP	NAVTENE	Navicula tenelloides	Hust.	OVB	L	W	DP	
BAP	NAVTERM	Navicula terminata	Hust.	OVB	L	W	DP	
BAP	NAVTRIP	Navicula tripunctata	(O.F. Mull.) Bory	OVB	L	W	DP	
BAP	NAVTRIPS	Navicula tripunctata var. schizonenmoides	(V.H.) Patr.	OVB	L	W	DP	
BAP	NAVTRIV	Navicula trivalvis	Lange-Bert.	OVB	L	W	DP	
BAP	NAVTUSC	Navicula tuscula	Ehr.	DMB	L	W	DP	
BAP	NAVTUSCM	Navicula tuscula f. minor	Hust.	OVB	L	W	DP	
BAP	NAVTUSCR	Navicula tuscula f. rostrata	Hust.	OVB	L	W	DP	
BAP	NAVUTER	Navicula utermoehliae	Hust.	OVB	L	W	DP	
BAP	NAVVIRI	Navicula viridula	(Kutz.) Ehr.	OVB	L	W	DP	
BAP	NAVVIRIA	Navicula viridula var. avenacea	(Breb.) V.H.	OVB	L	W	DP	
BAP	NAVVIRIR	Navicula viridula var. rostellata	(Kutz.) Cl.	OVB	L	W	DP	
BAP	NAVVITA	Navicula vitabunda	Hust.	OVB	L	W	DP	
BAP	NAVVULP	Navicula vulpina	Kutz.	DMB	L	W	DP	
BAP	NAVVULPA	Navicula vulpina var. avenacea	(V.H.) Patr.	OVB	L	W	DP	
BAP	NAVVWITT	Navicula wittrockii	(Lagst.) A. Cl.-Eu.	OVB	L	W	DP	
BAP	NAVZANO	Navicula zanoni	Hust.	OVB	L	W	DP	
BAP	NEIAFFI	Neidium affine	(Ehr.) Pfitz.	OVB	L	W	DP	
BAP	NEIDUBI	Neidium dubium	(Ehr.) Cl.	OVB	L	W	DP	
BAP	NEISP	Neidium sp.		OVB	L	W	DP	
CHL	NEODANU	Neodesmus danubialis	Hind	OVO	L	W		

**Sampling and Analytical Procedures  
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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	NCHPSP	<i>Nephrochlamys</i> sp.		FUS	L	W		
CHL	NCHSUBS	<i>Nephrochlamys subsolitaria</i>	(West) Korch.	FUS	L	W		
CHL	NCHWILL	<i>Nephrochlamys willeana</i>	(Printz) Korch.	FUS	L	W		
CHL	NCTAGAR	<i>Nephrocytium agardhianum</i>	Nag.	FUS	L	W		
CHL	NCTECDY	<i>Nephrocytium ecdisiscepanum</i>	W. West in W. & G.S. West.	FUS	L	W		
CHL	NCTLIMN	<i>Nephrocytium limneticum</i>	(G.M. Sm.) G.M. Sm.	FUS	L	W		
CHL	NCTSP	<i>Nephrocytium</i> sp.		FUS	L	W		
CRY	NEPSP1	<i>Nephroselmis</i> sp. #1		OVO	L	W		
BAP	NITACCO	<i>Nitzschia accomodata</i>	Hust.	DMB	L	W	DP	
BAP	NITACICO	<i>Nitzschia acicularoides</i>	Hust.	DMB	L	W	DP	
BAP	NITACICS	<i>Nitzschia acicularis</i>	W. Sm.	DMB	L	W	DP	
BAP	NITACTI	<i>Nitzschia actinastroides</i>	(Lemm.) Van Goor	DMB	L	W	DP	
BAP	NITACUL	<i>Nitzschia acula</i>	Hantz. ex Cl. & Grun.	DMB	L	W	DP	
BAP	NITACUM	<i>Nitzschia acuminata</i>	(W.Sm.) Grun.	DMB	L	W	DP	
BAP	NITACUT	<i>Nitzschia acuta</i>	Hantz.	DMB	L	W	DP	
BAP	NITALPI	<i>Nitzschia alpina</i>	Hust.	DMB	L	W	DP	
BAP	NITAMPH	<i>Nitzschia amphibia</i>	Grun.	DMB	L	W	DP	
BAP	NITAMPHA	<i>Nitzschia amphibia</i> var. <i>activiscula</i>	Grun.	DMB	L	W	DP	
BAP	NITANGU	<i>Nitzschia angustata</i>	(W. Sm.) Grun.	DMB	L	W	DP	
BAP	NITANGU?	<i>Nitzschia angustata</i> var. (?)		DMB	L	W	DP	
BAP	NITANGUA	<i>Nitzschia angustata</i> var. <i>acuta</i>	Grun.	DMB	L	W	DP	
BAP	NITANGA	<i>Nitzschia angustatula</i>	Lange-Bertalot 1987	DMB	L	W	DP	
BAP	NITANGA?	<i>Nitzschia angustatula</i> ?	Lange-Bertalot 1987	DMB	L	W	DP	
BAP	NITAPIC	<i>Nitzschia apiculata</i>	(Greg.) Grun.	DMB	L	W	DP	
BAP	NITARCH	<i>Nitzschia archibaldii</i>	Lange-Bert.	DMB	L	W	DP	
BAP	NITBACA	<i>Nitzschia bacata</i>	Hust.	DMB	L	W	DP	
BAP	NITCAPI	<i>Nitzschia capitellata</i>	Hust.	DMB	L	W	DP	
BAP	NITCLAU	<i>Nitzschia clausii</i>	Hantz.	DMB	L	W	DP	
BAP	NITCLOS	<i>Nitzschia closterium</i>	(Ehr.) W. Sm.	DMB	L	W	DP	
BAP	NITCOMM	<i>Nitzschia communis</i>	Rabh.	DMB	L	W	DP	
BAP	NITCONF	<i>Nitzschia confinis</i>	Hust.	DMB	L	W	DP	
BAP	NITDENT	<i>Nitzschia denticula</i>	Grun.	DMB	L	W	DP	
BAP	NITDISS	<i>Nitzschia dissipata</i>	(Kutz.) Grun.	DMB	L	W	DP	
BAP	NITDISSM	<i>Nitzschia dissipata</i> var. <i>media</i>	(Hantz.) Grun.	DMB	L	W	DP	
BAP	NITEPIP	<i>Nitzschia epiphytica</i>	O. Mull.	DMB	L	W	DP	
BAP	NITFONT	<i>Nitzschia fonticola</i>	Grun.	DMB	L	W	DP	
BAP	NITFRUS	<i>Nitzschia frustulum</i>	(Kutz.) Grun.	DMB	L	W	DP	
BAP	NITFRUSM	<i>Nitzschia frustulum</i> var. <i>minutula</i>	Grun.(?)	DMB	L	W	DP	
BAP	NITFRUST	<i>Nitzschia frustulum</i> var. <i>perminuta</i>	Grun.	DMB	L	W	DP	
BAP	NITFRUSP	<i>Nitzschia frustulum</i> var. <i>perpusilla</i>	(Rabh.) Grun.	DMB	L	W	DP	
BAP	NITFRUT	<i>Nitzschia fruticosa</i>	Hust.	DMB	L	W	DP	
BAP	NITGAND	<i>Nitzschia gandersheimiensis</i>	Krasske	DMB	L	W	DP	
BAP	NITGRACF	<i>Nitzschia graciliformis</i>	Lange-Bert. & Simonsen	DMB	L	W	DP	
BAP	NITGRACS	<i>Nitzschia gracilis</i>	Hantz.	DMB	L	W	DP	
BAP	NITGRACA	<i>Nitzschia gracilis</i> f. <i>acicularoides</i>	Coste & Ricard	DMB	L	W	DP	
BAP	NITHANT	<i>Nitzschia hantzschiana</i>	Rabh.	DMB	L	W	DP	
BAP	NITHOLL	<i>Nitzschia hollerupensis</i>	Foged	DMB	L	W	DP	
BAP	NITIMPR	<i>Nitzschia impressa</i>	Hust.	DMB	L	W	DP	
BAP	NITINCO	<i>Nitzschia inconspicua</i>	Grun.	DMB	L	W	DP	
BAP	NITINTE	<i>Nitzschia intermedia</i>	Hantz.	DMB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	NITKUETA	<i>Nitzschia kuetzingiana</i>	Hilse	DMB	L	W	DP	
BAP	NITKUETO	<i>Nitzschia kuetzingioides</i>	Hust.	DMB	L	W	DP	
BAP	NITLACU	<i>Nitzschia lacuum</i>	Lange-Bert.	DMB	L	W	DP	
BAP	NITLATE	<i>Nitzschia latens</i>	Hust.	DMB	L	W	DP	
BAP	NITLAUE	<i>Nitzschia lauenburgiana</i>	Hust.	DMB	L	W	DP	
BAP	NITLINE	<i>Nitzschia linearis</i>	(Ag.) W. Sm.	DMB	L	W	DP	
BAP	NITLUZO	<i>Nitzschia luzonensis</i>	Hust.	DMB	L	W	DP	
BAP	NITMEDI	<i>Nitzschia mediocris</i>	Hust.	DMB	L	W	DP	
BAP	NITMICR	<i>Nitzschia microcephala</i>	Grun.	DMB	L	W	DP	
BAP	NITMINUA	<i>Nitzschia minuta</i>	Bleisch	DMB	L	W	DP	
BAP	NITMINUU	<i>Nitzschia minutula</i>	Grun.	DMB	L	W	DP	
BAP	NITOBSI	<i>Nitzschia obsidialis</i>	Hust.	DMB	L	W	DP	
BAP	NITOVAL	<i>Nitzschia ovalis</i>	Arn.	DMB	L	W	DP	
BAP	NITPALEA	<i>Nitzschia palea</i>	(Kutz.) W. Sm.	DMB	L	W	DP	
BAP	NITPALED	<i>Nitzschia palea</i> var. <i>debilis</i>	(Kutz.) Grun.	DMB	L	W	DP	
BAP	NITPALET	<i>Nitzschia palea</i> var. <i>tenuirostris</i>	Grun.	DMB	L	W	DP	
BAP	NITPALEC	<i>Nitzschia paleacea</i>	Grun.	DMB	L	W	DP	
BAP	NITPARV	<i>Nitzschia parvula</i>	Lewis	DMB	L	W	DP	
BAP	NITPELA	<i>Nitzschia pelagica</i>	O. Mull.	DMB	L	W	DP	
BAP	NITPERM	<i>Nitzschia perminuta</i>	(Grun. in V.H.) M. Perag.	DMB	L	W	DP	
BAP	NITPERP	<i>Nitzschia perpusilla</i>	Rabh. (?)	DMB	L	W	DP	
BAP	NITPHIL	<i>Nitzschia philippinarum</i>	Hust.	DMB	L	W	DP	
BAP	NITPSEU	<i>Nitzschia pseudofonticola</i>	Hust.	DMB	L	W	DP	
BAP	NITPUMI	<i>Nitzschia pumila</i>	Hust.	DMB	L	W	DP	
BAP	NITPURA	<i>Nitzschia pura</i>	Hust.	DMB	L	W	DP	
BAP	NITPUSI	<i>Nitzschia pusilla</i>	(Kutz.) Grun. emend. Lange-Bert.	DMB	L	W	DP	
BAP	NITRECT	<i>Nitzschia recta</i>	Hantz.	DMB	L	W	DP	
BAP	NITRHOM	<i>Nitzschia rhombica</i>	Greg.	DMB	L	W	DP	
BAP	NITROMA	<i>Nitzschia romana</i>	Grun.	DMB	L	W	DP	
BAP	NITROST	<i>Nitzschia rostellata</i>	Hust.	DMB	L	W	DP	
BAP	NITSIGM	<i>Nitzschia sigmaeidea</i>	(Ehr.) W. Sm.	DMB	L	W	DP	
BAP	NITSINUT	<i>Nitzschia sinuata</i> var. <i>tabellaria</i>	(Grun.) Grun.	DMB	L	W	DP	
BAP	NITSOCI	<i>Nitzschia sociabilis</i>	Hust.	DMB	L	W	DP	
BAP	NITSP	<i>Nitzschia</i> sp.		DMB	L	W	DP	
BAP	NITSP1	<i>Nitzschia</i> sp. #1		DMB	L	W	DP	
BAP	NITSP10	<i>Nitzschia</i> sp. #10		DMB	L	W	DP	
BAP	NITSP11	<i>Nitzschia</i> sp. #11		DMB	L	W	DP	
BAP	NITSP12	<i>Nitzschia</i> sp. #12		DMB	L	W	DP	
BAP	NITSP13	<i>Nitzschia</i> sp. #13		DMB	L	W	DP	
BAP	NITSP14	<i>Nitzschia</i> sp. #14		DMB	L	W	DP	
BAP	NITSP15	<i>Nitzschia</i> sp. #15		DMB	L	W	DP	
BAP	NITSP16	<i>Nitzschia</i> sp. #16		DMB	L	W	DP	
BAP	NITSP17	<i>Nitzschia</i> sp. #17		DMB	L	W	DP	
BAP	NITSP2	<i>Nitzschia</i> sp. #2		DMB	L	W	DP	
BAP	NITSP3	<i>Nitzschia</i> sp. #3		DMB	L	W	DP	
BAP	NITSP4	<i>Nitzschia</i> sp. #4		DMB	L	W	DP	
BAP	NITSP6	<i>Nitzschia</i> sp. #6		DMB	L	W	DP	
BAP	NITSP7	<i>Nitzschia</i> sp. #7		DMB	L	W	DP	
BAP	NITSP8	<i>Nitzschia</i> sp. #8		DMB	L	W	DP	
BAP	NITSP9	<i>Nitzschia</i> sp. #9		DMB	L	W	DP	
BAP	NITSPDL1	<i>Nitzschia</i> sp. (DL # 1)		DMB	L	W	DP	
BAP	NITSPDL3	<i>Nitzschia</i> sp. (DL # 375)		DMB	L	W	DP	

**Sampling and Analytical Procedures  
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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	NITSPDL4	<i>Nitzschia</i> sp. (DL # 44)		DMB	L	W	DP	
BAP	NITSPA	<i>Nitzschia</i> sp. A		DMB	L	W	DP	
BAP	NITSPB	<i>Nitzschia</i> sp. B		DMB	L	W	DP	
BAP	NITSPICO	<i>Nitzschia</i> spiculoides	Hust.	DMB	L	W	DP	
BAP	NITSPICU	<i>Nitzschia</i> spiculum	Hust.	DMB	L	W	DP	
BAP	NITSTRI	<i>Nitzschia</i> striolata	Hust.	DMB	L	W	DP	
BAP	NITSUBA	<i>Nitzschia</i> subacicularis	Hust.	DMB	L	W	DP	
BAP	NITSUBC	<i>Nitzschia</i> subcommunis	Hust.	DMB	L	W	DP	
BAP	NITSUBL	<i>Nitzschia</i> sublinearis	Hust.	DMB	L	W	DP	
BAP	NITSUBR	<i>Nitzschia</i> subrostrata	Hust.	DMB	L	W	DP	
BAP	NITTENU	<i>Nitzschia</i> tenuis	W. Sm.	DMB	L	W	DP	
BAP	NITTHER	<i>Nitzschia</i> thermalis	Kutz.	DMB	L	W	DP	
BAP	NITTROP	<i>Nitzschia</i> tropica	Hust.	DMB	L	W	DP	
BAP	NITTRYB	<i>Nitzschia</i> tryblionella var. (?)		OVB	L	W	DP	
BAP	NITTRYBD	<i>Nitzschia</i> tryblionella var. debilis	(Arn.) A. Mayer	OVB	L	W	DP	
BAP	NITTRYBS	<i>Nitzschia</i> tryblionella var. subsalina	Grun.	OVB	L	W	DP	
BAP	NITTRYBV	<i>Nitzschia</i> tryblionella var. victoriae	Grun.	OVB	L	W	DP	
BAP	NITVALD	<i>Nitzschia</i> valdestriata	Aleem & Hust.	DMB	L	W	DP	
BAP	NITVERM	<i>Nitzschia</i> vermicularis	(Kutz.) Grun.	DMB	L	W	DP	
CHR	OCHCOLO	Ochromonadaceae colonial form		OVO	L	W		
CHR	OCHSPOV	<i>Ochromonas</i> sp. - ovoid		OVO	L	W		
CHR	OCHSPSP	<i>Ochromonas</i> sp. - sphere		SPH			D	
CHR	OCHSP4	<i>Ochromonas</i> sp. #4		OVO	L	W		
CHL	OEDSP	<i>Oedogonium</i> sp.		CYL	L	W	DP	D
CHL	OOCBORG	<i>Oocystis</i> borgei	Snow	OVO	L	W		
CHL	OOCCRAS	<i>Oocystis</i> crassa	Witt.	OVO	L	W		
CHL	OOCELLIP	<i>Oocystis</i> elliptica	W. West	OVO	L	W		
CHL	OOCELVMI	<i>Oocystis</i> elliptica f. minor	W. West	OVO	L	W		
CHL	OOCGIVIN	<i>Oocystis</i> gigas var. incrassata	West & West sensu Skuja	OVO	L	W		
CHL	OOCLACU	<i>Oocystis</i> lacustris	Chod.	OVO	L	W		
CHL	OOCMARS	<i>Oocystis</i> marssonii	Lemm.	OVO	L	W		
CHL	OOCNATAM	<i>Oocystis</i> natans v. major	G.M. Smith	OVO	L	W		
CHL	OOCNODU	<i>Oocystis</i> nodulosa var ?	W. & G.S. West.	OVO	L	W		
CHL	OOCNOVA	<i>Oocystis</i> novae-semliae	W. & G.S. West	OVO	L	W		
CHL	OOCPARV	<i>Oocystis</i> parva	W. & G.S. West	OVO	L	W		
CHL	OOCPUSI	<i>Oocystis</i> pusilla	Hansg.	OVO	L	W		
CHL	OOCRHOM	<i>Oocystis</i> rhomboidea	Fott	OVO	L	W		
CHL	OOC SOLI	<i>Oocystis</i> solitaria	Witt.	OVO	L	W		
CHL	OOCSP	<i>Oocystis</i> sp.		OVO	L	W		
CHL	OOCSP1	<i>Oocystis</i> sp. #1		OVO	L	W		
CHL	OOCSUBM	<i>Oocystis</i> submarina	Lag.	OVO	L	W		
BAP	OPEMART	<i>Opephora</i> martyi	Herib.	OVB	L	W	DP	
BAP	OPESP	<i>Opephora</i> sp.		OVB	L	W	DP	
CYA	OSCAGAR	<i>Oscillatoria</i> agardhii	Gom.	CYL	L	W	DP	D
CYA	OSCAMOE	<i>Oscillatoria</i> amoena	(Kutz.) Gom.	CYL	L	W	DP	D
CYA	OSCBORN	<i>Oscillatoria</i> bornetii	Zukal	CYL	L	W	DP	D
CYA	OSCFORM	<i>Oscillatoria</i> formosa	Bory	CYL	L	W	DP	D
CYA	OSCLIMN	<i>Oscillatoria</i> limnetica	Lemm.	CYL	L	W	DP	D
CYA	OSCLIMN?	<i>Oscillatoria</i> limnetica var. (?)		CYL	L	W	DP	D
CYA	OSCMINI	<i>Oscillatoria</i> minima	Gick.	CYL	L	W	DP	D
CYA	OSCPROL	<i>Oscillatoria</i> prolifica	(Grev.) Gom.	CYL	L	W	DP	D

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CYA	OSCRUBE	Oscillatoria rubescens	De Cand.	CYL	L	W	DP	D
CYA	OSCSP	Oscillatoria sp.		CYL	L	W	DP	D
CYA	OSCSP1	Oscillatoria sp. #1		CYL	L	W	DP	D
CYA	OSCSUBB	Oscillatoria subbrevis	Schm.	CYL	L	W	DP	D
CYA	OSCTENU	Oscillatoria tenuis	C.A. Ag.	CYL	L	W	DP	D
CYA	OSCTENUN	Oscillatoria tenuis var. natans	Gom.	CYL	L	W	DP	D
CYA	OSCTENUT	Oscillatoria tenuis var. tergestina	(Kutz.) Rabh.	CYL	L	W	DP	D
CHL	PANMORU	Pandorina morum	(Muell.) Bory	OVO	L	W		
CHL	PANSP	Pandorina sp.		OVO	L	W		
CHL	PARMULT	Paradoxia multiseta	Swir.	CLA	L	W		
CHR	PARSP	Paraphysomonas sp.		OVO	L	W		
CHL	PAUTENE	Paulschulzia tenera	(Kors.) Lund	OVO	L	W		
CHL	PEDBIRA	Pediastrum biradiatum	Meyer 1829	OVB	L	W	DP	
CHL	PEDBORY	Pediastrum boryanum	(Turp.) Menegh.	OVB	L	W	DP	
CHL	PEDDUPL	Pediastrum duplex	Meyen	OVB	L	W	DP	
CHL	PEDDUPLC	Pediastrum duplex var. clathratum	(A. Braun) Lag.	OVB	L	W	DP	
CHL	PEDDUPLG	Pediastrum duplex var. gracillimum	W. & G.S. West	OVB	L	W	DP	
CHL	PEDDUPLR	Pediastrum duplex var. reticulatum	Lag.	OVB	L	W	DP	
CHL	PEDINTEP	Pediastrum integrum var. priva	Printz (?)	OVB	L	W	DP	
CHL	PEDSIMP	Pediastrum simplex	(Meyen) Lemm.	OVB	L	W	DP	
CHL	PEDSIMPE	Pediastrum simplex v. echin	Wittrock	OVB	L	W	DP	
CHL	PEDSIMPD	Pediastrum simplex var. duodenarium	(Bail.) Rabh.	OVB	L	W	DP	
CHL	PEDSP	Pediastrum sp.		OVB	L	W	DP	
CHL	PEDTETR	Pediastrum tetras	(Ehr.) Ralfs	OVB	L	W	DP	
CHL	PEDTETRT	Pediastrum tetras var. tetraedon	(Corda) Rabh.	OVB	L	W	DP	
PYR	PERACIC	Peridinium aciculiferum	Lemm.	OVO	L	W		
PYR	PERAFRIR	Peridinium africanum var. remotum	Lef.	OVO	L	W		
PYR	PERALLO	Peridinium allorgei	Lef.(?)	OVO	L	W		
PYR	PERBIPE	Peridinium bipes	Stein	OVO	L	W		
PYR	PERCINC	Peridinium cinctum	(Mull.) Ehr.	OVO	L	W		
PYR	PERCUNN	Peridinium cunningtonii	(Lemm.) Lemm. (?)	OVO	L	W		
PYR	PERCUNNR	Peridinium cunningtonii subsp. remotum	(Lindem.) Lef.	OVO	L	W		
PYR	PERINCO	Peridinium inconspicuum	Lemm.	OVO	L	W		
PYR	PERPUSI	Peridinium pusillum	(Pen.) Lemm.	OVO	L	W		
PYR	PERSP	Peridinium sp.		OVO	L	W		
PYR	PERSP2	Peridinium sp. #2		OVO	L	W		
PYR	PERWILL	Peridinium willei	Huitf.-Kaas	OVO	L	W		
CHL	PHAMINU	Phacotus minuscula	Bourr.	OVO	L	W		
CHL	PHASPC	Phacotus sp.		OVO	L	W		
EUG	PHASPE	Phacus sp.		OVO	L	W		
CYA	PHOINUN	Phormidium inundatum	Kutz.	CYL	L	W	DP	D
CYA	PHOSP	Phormidium sp.		CYL	L	W	DP	D
CHL	PHYSP	Phythewlos sp.		SPH				D
UNK	PICFLAG	Picoplankton flagellates		OVO	L	W		
CYA	PICRODS	Picoplankton rods		CYL	L	W	DP	D
CYA	PICSPHE	Picoplankton spheres		SPH				D
BAP	PININTEM	Pinnularia interrupta var. minutissima	Hust.	OVB	L	W	DP	
BAP	PINLATA	Pinnularia lata	(Breb.) Sm..	OVB	L	W	DP	
BAP	PINMICR	Pinnularia microstauron	(Ehr.) Cl.	OVB	L	W	DP	
BAP	PINRUPE	Pinnularia rupestris	Hantz.	OVB	L	W	DP	
BAP	PINSP	Pinnularia sp.		OVB	L	W	DP	
BAP	PINSUBC	Pinnularia subcapitata	Greg.	OVB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	PINVIRIC	<i>Pinnularia viridis</i> var. <i>commutata</i>	(Grun.) Cl.	OVB	L	W	DP	
BAP	PLALEPIP	<i>Plagiotropis lepidoptera</i> var. <i>proboscidia</i>	(Cl.) Reim.	DMB	L	W	DP	
CHL	PLKLAUT	<i>Planktonema lauterborni</i>	Schm.	CYL	L	W	DP	D
CHL	PLKSP	<i>Planktonema</i> sp.		CYL	L	W	DP	D
CHL	PKAGELA	<i>Planktosphaeria gelatinosa</i>	G.M. Sm.	SPH				D
CHR	PORSP1	<i>Porochrysis</i> sp. #1		OVO	L	W		
CHR	PSEACUT	<i>Pseudokephyrion acutum</i>	Schill	OVO	L	W		
CHR	PSEALAS	<i>Pseudokephyrion alaskanum</i>	Hill	OVO	L	W		
CHR	PSEATTE	<i>Pseudokephyrion attenuatum</i>	Hill	OVO	L	W		
CHR	PSECONI	<i>Pseudokephyrion conicum</i>	(Schill.) Schm.	OVO	L	W		
CHR	PSECYLI	<i>Pseudokephyrion cylindrcum</i>	Bourr.	OVO	L	W		
CHR	PSEELLI	<i>Pseudokephyrion ellipsoidium</i>	(Pasch.) Schm.	OVO	L	W		
CHR	PSEENTZ	<i>Pseudokephyrion entzii</i>	Con.	OVO	L	W		
CHR	PSEFORM	<i>Pseudokephyrion formosissimum</i>	Conr.	OVO	L	W		
CHR	PSELATU	<i>Pseudokephyrion latum</i>	(Schill.) Schm.	OVO	L	W		
CHR	PSEMILL	<i>Pseudokephyrion millerense</i>	Nich.	OVO	L	W		
CHR	PSEMINU	<i>Pseudokephyrion minutissimum</i>	Corr.	OVO	L	W		
CHR	PSESP	<i>Pseudokephyrion</i> sp.		OVO	L	W		
CHR	PSESP1	<i>Pseudokephyrion</i> sp. #1		OVO	L	W		
CHR	PSESP2	<i>Pseudokephyrion</i> sp. #2		OVO	L	W		
CHR	PSEUNDU	<i>Pseudokephyrion undulatissimum</i>	Scherf.	OVO	L	W		
CHL	PTESP	<i>Pteromonas</i> sp.		OVO	L	W		
CHL	PYRSP	<i>Pyramidomonas</i> sp.		CON	L	W		
CHL	QUACHOD	<i>Quadrigula chodatii</i>		FUS	L	W		
CHL	QUACLOS	<i>Quadrigula closterioides</i>	(Bohl.) Printz.	OVO	L	W		
CHL	QUALACU	<i>Quadrigula lacustris</i>	(Chod.) G.M. Sm.	OVO	L	W		
CHL	RAPSIGM	<i>Raphidiocelis sigmaoidea</i>	Hind.	FUS	L	W		
CYA	RAPCURV	<i>Raphidiopsis curvata</i>	Fritsch & Rich	FUS	L	W		
CYA	RAPMEDI	<i>Raphidiopsis mediterranea</i>	Skuja	FUS	L	W		
CYA	RAPSP	<i>Raphidiopsis</i> sp.		FUS	L	W		
CHL	RAYHEMI	<i>Rayssiella hemisphaerica</i>	Edelst. & Presc.	OVO	L	W		
CYA	RHAGORS	<i>Rhabdoderma gorskii</i>	Wol.	OVO	L	W		
CYA	RHASP	<i>Rhabdoderma</i> sp.		FUS	L	W		
CHR	RHIMAJO	<i>Rhizochrysis major</i>	Naum.	OVO	L	W		
CHR	RHISPC	<i>Rhizochrysis</i> sp.		OVO	L	W		
BAC	RHIERIE	<i>Rhizosolenia eriensis</i>	H.L. Sm.	CYL	L	W	DP	D
BAC	RHIGRAC	<i>Rhizosolenia gracilis</i>	H.L. Sm.	CYL	L	W	DP	D
BAC	RHILONG	<i>Rhizosolenia longiseta</i>	Zach.	CYL	L	W	DP	D
BAC	RHISPB	<i>Rhizosolenia</i> sp.		CYL	L	W	DP	D
CRY	RHOLACU	<i>Rhodomonas lacustris</i>	Pasch. & Rutt.	TRP	L	W		
CRY	RHOLENS	<i>Rhodomonas lens</i>	Pasch. & Rutt.	TRP	L	W		
CRY	RHOMINU	<i>Rhodomonas minuta</i>	Skuja	TRP	L	W		
CRY	RHOMINUN	<i>Rhodomonas minuta</i> var. <i>nannoplancitca</i>	Skuja	TRP	L	W		
CRY	RHOPUSI	<i>Rhodomonas pusilla</i>	Bach.	TRP	L	W		
CRY	RHOSPC	<i>Rhodomonas</i> sp.		TRP	L	W		
BAP	RHOCURV	<i>Rhoicosphenia curvata</i>	(Kutz.) Grun. ex Rabh.	OVB	L	W	DP	
BAP	RHOSPB	<i>Rhoicosphenia</i> sp.		OVB	L	W	DP	
CHR	SALAMPH	<i>Salpingoeca amphorae</i>	Kent	OVO	L	W		
CHR	SALGRAC	<i>Salpingoeca gracilis</i>	Clark	OVO	L	W		
CHR	SALSP	<i>Salpingoeca</i> sp.		OVO	L	W		

**Standard Operating Procedure for Phytoplankton Analysis**

DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	SCEABUN	Scenedesmus abundans	(Kirch.) Chod.	OVO	L	W		
CHL	SCEACUM	Scenedesmus acuminatus	(Lag.) Chod.	FUS	L	W		
CHL	SCEACUMT	Scenedesmus acuminatus var. tortuosus	(Skuja) Uherk.	FUS	L	W		
CHL	SCEACUT	Scenedesmus acutus	Meyen	FUS	L	W		
CHL	SCEARCU	Scenedesmus arcuatus	Lemm.	FUS	L	W		
CHL	SCEARMA	Scenedesmus armatus	(Chod.) G.M. Sm.	OVO	L	W		
CHL	SCEARMAB	Scenedesmus armatus var. bicaudatus	(Gugl.-Prinz) Chod.	OVO	L	W		
CHL	SCEBALA	Scenedesmus balantonicus	Hort.	OVO	L	W		
CHL	SCEBICA	Scenedesmus bicaudatus	(Hansg.) Chod.	OVO	L	W		
CHL	SCEBICAB	Scenedesmus bicaudatus var. brevicaudatus	Hort.	OVO	L	W		
CHL	SCEBIJU	Scenedesmus bijuga	(Turp.) Lag.	OVO	L	W		
CHL	SCEBRAS	Scenedesmus brasiliensis	Bohlin	OVO	L	W		
CHL	SCEBREV	Scenedesmus brevispina	(G. M. Sm.) Chod.	OVO	L	W		
CHL	SCECARI	Scenedesmus carinatus	(Lemm.) Chod.	OVO	L	W		
CHL	SCEDENT	Scenedesmus denticulatus	Kirch.	OVO	L	W		
CHL	SCEDENTL	Scenedesmus denticulatus var. linearis	Hansg.	OVO	L	W		
CHL	SCEDIMO	Scenedesmus dimorphus	(Turp.) Kutz.	OVO	L	W		
CHL	SCEDISP	Scenedesmus dispar	Breb.	OVO	L	W		
CHL	SCEECOR	Scenedesmus ecornis	(Ralfs) Chod.	OVO	L	W		
CHL	SCEECORD	Scenedesmus ecornis var. disciformis	Chod.	OVO	L	W		
CHL	SCEECCORS	Scenedesmus ecornis var. disciformis f. spinosus	Hort. & Nemeth	OVO	L	W		
CHL	SCEELLI	Scenedesmus ellipsoideus	Chod.	OVO	L	W		
CHL	SCEGRAN	Scenedesmus granulatus	W. & G.S. West	OVO	L	W		
CHL	SCEINTE	Scenedesmus intermedius	Chod.	OVO	L	W		
CHL	SCEINTEA	Scenedesmus intermedius var. acaudatus	Hort.	OVO	L	W		
CHL	SCEINTEB	Scenedesmus intermedius var. balantonicus	Hort.	OVO	L	W		
CHL	SCEINTEI	Scenedesmus intermedius var. bicaudatus	Hort.	OVO	L	W		
CHL	SCEMICR	Scenedesmus microspina	Chod.	OVO	L	W		
CHL	SCEOPOL	Scenedesmus opoliensis	P. Richt.	OVO	L	W		
CHL	SCEQUAD	Scenedesmus quadricauda	(Turp.) Breb.	OVO	L	W		
CHL	SCEQUADB	Scenedesmus quadricauda var. biornatus	Kiss	OVO	L	W		
CHL	SCEQUADL	Scenedesmus quadricauda var. longispina	(Chod.) G.M. Sm	OVO	L	W		
CHL	SCEQUADM	Scenedesmus quadricauda var. maxima	W. & G.S. West	OVO	L	W		
CHL	SCEQUADQ	Scenedesmus quadricauda var. quadrispina	(Chod.) G.M. Sm.	OVO	L	W		
CHL	SCEQUADC	Scenedesmus quadricauda var.longispina f capricornus	(Skuja) Uher.	OVO	L	W		
CHL	SCESECU	Scenedesmus securiformis	Playf.	OVO	L	W		
CHL	SCESERR	Scenedesmus serratus	(Corda) Bohl.	OVO	L	W		
CHL	SCESP	Scenedesmus sp.		OVO	L	W		
CHL	SCESPIC	Scenedesmus spicatus	W. & G.S. West	OVO	L	W		
CHL	SCESPIN	Scenedesmus spinosus	Chod.	OVO	L	W		
CHL	SCESUBS	Scenedesmus subspicatus	Chod.	OVO	L	W		
CHL	SCEVELI	Scenedesmus velitaris	Kom.	OVO	L	W		
CHL	SCHCOMP	Schizoclamys compacta	Presc.	OVO	L	W		
CYA	SCHSP	Schizothrix sp.		CYL	L	W	DP	D
CHL	SCHANTI	Schroederia antillarum	Kom.	FUS	L	W		

**Sampling and Analytical Procedures  
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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	SCHINDI	Schroederia indica	Phillip	FUS	L	W		
CHL	SCHJUDA	Schroederia judayi		FUS	L	W		
CHL	SCHSETI	Schroederia setigera	(Schroed.) Lemm.	FUS	L	W		
CRY	SENPARV	Sennia parvula	Skuja	OVO	L	W		
BAC	SKEPOTA	Skeletonema potamos	(Weber) Hasle & Evens.	CYL	L	W	DP	D
BAC	SKESP	Skeletonema sp.		CYL	L	W	DP	D
CHL	SLCELLI	Sphaerellocystis ellipsoidea	Ettl	OVO	L	W		
CHL	SLCLATE	Sphaerellocystis lateralis	Fott & Novak.	OVO	L	W		
CHL	SPLELON	Sphaerellopsis elongata	Skvortz.	OVO	L	W		
CHL	SPLSP	Sphaerellopsis sp.		OVO	L	W		
CHL	SPYSCHR	Sphaerocystis schroeteri	Chod.	OVO	L	W		
CHR	SPCVOLV	Sphaeroeca volvox	Laut.	OVO	L	W		
CHR	SPISP	Spiniferomonas sp.		OVO	L	W		
CYA	SPUMAJO	Spirulina major	Kutz.	CYL	L	W	DP	D
CYA	SPUSP	Spirulina sp.		CYL	L	W	DP	D
CYA	SPUSUBT	Spirulina subtilissima	Kutz. ex Gom.	CYL	L	W	DP	D
CHL	STAANAT	Staurastrum anatinum	Cooke & Wills (?)	STR	L	W		
CHL	STAELLIM	Staurastrum ellipticum var. minor	W. West	STR	L	W		
CHL	STAGRAC	Staurastrum gracile	Ralfs	STR	L	W		
CHL	STALACU	Staurastrum lacustris	G.M. Sm.	STR	L	W		
CHL	STALEPT	Staurastrum leptocladum	Nord.	STR	L	W		
CHL	STAPARA	Staurastrum paradoxum	Meyen	STR	L	W		
CHL	STASPD	Staurastrum sp.		STR	L	W		
CHL	STASP1	Staurastrum sp. # 1		STR	L	W		
CHL	STSMAMI	Staurodesmus mammillatus	(Nordst.) Teil.	STR	L	W		
BAP	STUACUT	Stauroneis acutiuscula	Herib.	DMB	L	W	DP	
BAP	STUKRIE	Stauroneis kriegeri	Patr.	DMB	L	W	DP	
BAP	STUSMIT	Stauroneis smithii	Grun.	DMB	L	W	DP	
BAP	STUSMINC	Stauroneis smithii var. incisa	Pant.	DMB	L	W	DP	
BAP	STUSMVM	Stauroneis smithii var. minuta	Haw.	DMB	L	W	DP	
BAP	STUASP	Stauroneis sp.		DMB	L	W	DP	
CHR	STEDICH	Stelexomonas dichotoma	Lack.	OVO	L	W		
CHR	STESPC	Stelexomonas sp.		OVO	L	W		
BAC	STEPHCOS	Stephanocostis sp.	Genkal & Kosmina 1985	CYL	L	W	DP	D
BAC	STEALPI	Stephanodiscus alpinus	Hust.	CYL	L	W	DP	D
BAC	STEALPV?	Stephanodiscus alpinus var. (?)		CYL	L	W	DP	D
BAC	STEASTR	Stephanodiscus astraea	(Ehr.) Grun.	CYL	L	W	DP	D
BAC	STEBIND	Stephanodiscus binderanus	(Kutz.) Krieg.	CYL	L	W	DP	D
BAC	STEBINDO	Stephanodiscus binderanus var. oestruppii	(A. Cl.) A. Cl.	CYL	L	W	DP	D
BAC	STECARC	Stephanodiscus carconensis	Grun.	CYL	L	W	DP	D
BAC	STECARCP	Stephanodiscus carconensis var. pusilla	Grun.	CYL	L	W	DP	D
BAC	STECONSP	Stephanodiscus conspicueporus	Stoermer, Hakansson & Theriot 1988	CYL	L	W	DP	D
BAC	STEHANTH	Stephanodiscus hantzschii f. hantzschii	Hak. & Stoerm.	CYL	L	W	DP	D
BAC	STEHANTT	Stephanodiscus hantzschii f. tenuis	Hak. & Stoerm.	CYL	L	W	DP	D
BAC	STEHANT1	Stephanodiscus hantzschii f. tenuis #1		CYL	L	W	DP	D
BAC	STEHANT2	Stephanodiscus hantzschii f. tenuis #2		CYL	L	W	DP	D
BAC	STEHANTF	Stephanodiscus hantzschii f. tenuis (fine form )		CYL	L	W	DP	D

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAC	STEMINUT	<i>Stephanodiscus minutulus</i>	Hak.	CYL	L	W	DP	D
BAC	STEMINV?	<i>Stephanodiscus minutulus</i> (?)		CYL	L	W	DP	D
BAC	STENIAG	<i>Stephanodiscus niagarae</i>	Ehr.	CYL	L	W	DP	D
BAC	STENIAGM	<i>Stephanodiscus niagarae</i> var. magnifica	Fricke	CYL	L	W	DP	D
BAC	STEPARV	<i>Stephanodiscus parvus</i>	Stoerm. & Hak.	CYL	L	W	DP	D
BAC	STEPARV1	<i>Stephanodiscus parvus</i> var. #1	in house taxon	CYL	L	W	DP	D
BAC	STESPB	<i>Stephanodiscus</i> sp.		CYL	L	W	DP	D
BAC	STESP1	<i>Stephanodiscus</i> sp. #1		CYL	L	W	DP	D
BAC	STESP10	<i>Stephanodiscus</i> sp. #10	in house taxon	CYL	L	W	DP	D
BAC	STESP13	<i>Stephanodiscus</i> sp. #13		CYL	L	W	DP	D
BAC	STESP14	<i>Stephanodiscus</i> sp. #14		CYL	L	W	DP	D
BAC	STESP15	<i>Stephanodiscus</i> sp. #15		CYL	L	W	DP	D
BAC	STESP16	<i>Stephanodiscus</i> sp. #16	in house taxon	CYL	L	W	DP	D
BAC	STESP17	<i>Stephanodiscus</i> sp. #17	in house taxon	CYL	L	W	DP	D
BAC	STESP2	<i>Stephanodiscus</i> sp. #2		CYL	L	W	DP	D
BAC	STESP21	<i>Stephanodiscus</i> sp. #21	in house taxon	CYL	L	W	DP	D
BAC	STESP3	<i>Stephanodiscus</i> sp. #3		CYL	L	W	DP	D
BAC	STESP31	<i>Stephanodiscus</i> sp. #31	in house taxon	CYL	L	W	DP	D
BAC	STESP4	<i>Stephanodiscus</i> sp. #4		CYL	L	W	DP	D
BAC	STESP40	<i>Stephanodiscus</i> sp. #40		CYL	L	W	DP	D
BAC	STESP5	<i>Stephanodiscus</i> sp. #5		CYL	L	W	DP	D
BAC	STESP50	<i>Stephanodiscus</i> sp. #50		CYL	L	W	DP	D
BAC	STESP51	<i>Stephanodiscus</i> sp. #51	in house taxon	CYL	L	W	DP	D
BAC	STESP7	<i>Stephanodiscus</i> sp. #7		CYL	L	W	DP	D
BAC	STESP8	<i>Stephanodiscus</i> sp. #8		CYL	L	W	DP	D
BAC	STESP9	<i>Stephanodiscus</i> sp. #9		CYL	L	W	DP	D
BAC	STESPFIN	<i>Stephanodiscus</i> sp. (finely striated form)		CYL	L	W	DP	D
BAC	STESUBT	<i>Stephanodiscus subtilis</i>	(Van Goor) A. Cl.	CYL	L	W	DP	D
BAC	STEPSBTR	<i>Stephanodiscus subtransylvanicus</i>	Gasse	CYL	L	W	DP	D
BAC	STETRAN	<i>Stephanodiscus transylvanicus</i>	Pant.	CYL	L	W	DP	D
CHL	STISP	<i>Stichococcus</i> sp.		OVO	L	W		
CHR	STCSP	<i>Stichogloea</i> sp.		OVO	L	W		
CHR	STYAURE	<i>Stylothecea aurea</i>	(Bachm.) Boloch.	OVO	L	W		
CHR	STYSP1	<i>Stylothecea</i> sp. #1		OVO	L	W		
CHR	STYSP?)	<i>Stylothecea</i> sp. (?)		OVO	L	W		
BAP	SURANGU	<i>Surirella angusta</i>	Kutz.	OVB	L	W	DP	
BAP	SURBIRO	<i>Surirella birostrata</i>	Hust.	OVB	L	W	DP	
BAP	SURBISEP	<i>Surirella biseriata</i> var. <i>bifrons f. punctata</i>	Meist.	OVB	L	W	DP	
BAP	SURLINEC	<i>Surirella linearis</i> var. <i>constricta</i>	Grun.	OVB	L	W	DP	
BAP	SUROVAL	<i>Surirella ovalis</i>	Breb.	OVB	L	W	DP	
BAP	SUROVAT	<i>Surirella ovata</i>	Kutz.	OVB	L	W	DP	
BAP	SUROVATP	<i>Surirella ovata</i> var. <i>pinnata</i>	(W. Sm.) Hust.	OVB	L	W	DP	
BAP	SUROVATG	<i>Surirella ovata</i> var. <i>pinnata f. gibbosa</i>	Tynni	OVB	L	W	DP	
BAP	SUROVATS	<i>Surirella ovata</i> var. <i>salina</i>	(W. Sm.) Hust.	OVB	L	W	DP	
BAP	SURSP	<i>Surirella</i> sp.		OVB	L	W	DP	
BAP	SURTURG	<i>Surirella turgida</i>	W. Sm.	OVB	L	W	DP	
CYA	CO CSP	<i>Synechococcus</i> sp.		CYL	L	W	DP	D
BAP	SYNACUS	<i>Synedra acus</i>	Kutz.	DMB	L	W	DP	
BAP	SYNAMPH	<i>Synedra amphicephala</i>	Kutz.	DMB	L	W	DP	
BAP	SYNAMPHA	<i>Synedra amphicephala</i> var. <i>austriaca</i>	(Grun.) Hust.	DMB	L	W	DP	
BAP	SYNCYCL	<i>Synedra cyclopum</i>	Brut.	DMB	L	W	DP	
BAP	SYNDELI	<i>Synedra delicatissima</i>	W. Sm.	DMB	L	W	DP	

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
BAP	SYNDELIA	<i>Synedra delicatissima</i> var. <i>angustissima</i>	Grun.	DMB	L	W	DP	
BAP	SYNDEME	<i>Synedra demerarae</i>	Grun.	DMB	L	W	DP	
BAP	SYNDEME?	<i>Synedra demerarae</i> var. (?) (with capitate ends)		DMB	L	W	DP	
BAP	SYNFAMI	<i>Synedra familica</i>	Kutz.	DMB	L	W	DP	
BAP	SYNFILI	<i>Synedra filiformis</i>	Grun.	DMB	L	W	DP	
BAP	SYNFILIE	<i>Synedra filiformis</i> var. <i>exilis</i>	A. Cl.	DMB	L	W	DP	
BAP	SYNMINU	<i>Synedra miniscula</i>	Grun.	DMB	L	W	DP	
BAP	SYNNANA	<i>Synedra nana</i>	Meister	DMB	L	W	DP	
BAP	SYNOSTE	<i>Synedra ostenfeldii</i>	(Krieg.) A. Cl.	DMB	L	W	DP	
BAP	SYNPARA	<i>Synedra parasitica</i>	W. Sm.	DMB	L	W	DP	
BAP	SYNPARAS	<i>Synedra parasitica</i> var. <i>subconstricta</i>	(Grun.) Grun.	DMB	L	W	DP	
BAP	SYNPULC	<i>Synedra pulchella</i>	Ralfs ex Kutz	DMB	L	W	DP	
BAP	SYNRADI	<i>Synedra radians</i>	Kutz.	DMB	L	W	DP	
BAP	SYNRUMP	<i>Synedra rumpens</i>	Kutz.	DMB	L	W	DP	
BAP	SYNRUMPS	<i>Synedra rumpens</i> var. <i>scotica</i>	Grun.	DMB	L	W	DP	
BAP	SYNSOC	<i>Synedra socia</i>	Wallace	DMB	L	W	DP	
BAP	SYNSPP	<i>Synedra</i> sp.		DMB	L	W	DP	
BAP	SYNSP1	<i>Synedra</i> sp. # 1		DMB	L	W	DP	
BAP	SYNSP2	<i>Synedra</i> sp. # 2		DMB	L	W	DP	
BAP	SYNSP3	<i>Synedra</i> sp. # 3	in house taxon	DMB	L	W	DP	
BAP	SYNTENE	<i>Synedra tenera</i>	W. Sm.	DMB	L	W	DP	
BAP	SYNULNA	<i>Synedra ulna</i>	(Nitz.) Ehr.	DMB	L	W	DP	
BAP	SYNULNAB	<i>Synedra ulna</i> var. <i>biceps</i>	Kutz.	DMB	L	W	DP	
BAP	SYNULNAH	<i>Synedra ulna</i> var. <i>chaseana</i>	Thomas	DMB	L	W	DP	
BAP	SYNULNAO	<i>Synedra ulna</i> var. <i>contracta</i>	Venkt.	DMB	L	W	DP	
BAP	SYNULNAD	<i>Synedra ulna</i> var. <i>danica</i>	(Kutz.) V.H.	DMB	L	W	DP	
BAP	SYNULNAL	<i>Synedra ulna</i> var. <i>longissima</i>	(W. Sm.) Brun.	DMB	L	W	DP	
CHR	SYNSPR	<i>Synura</i> sp.		OVO	L	W		
BAP	TABFENE	<i>Tabellaria fenestrata</i>	(Lyngb.) Kutz.	RTB	L	W	DP	
BAP	TABFLOC	<i>Tabellaria flocculosa</i>	(Roth) Knud.	RTB	L	W	DP	
BAP	TABFLOCG	<i>Tabellaria flocculosa</i> var. <i>geniculata</i>	(A. Cl.) Knud.	TFG	L	W	DP	D
BAP	TABFLOCL	<i>Tabellaria flocculosa</i> var. <i>linearis</i>	Kopp.	RTB	L	W	DP	
BAP	TABSP	<i>Tabellaria</i> sp.		RTB	L	W	DP	
CHL	TETALTE	<i>Tetrachlorella alternans</i>	(G.M. Sm.) Kors.	OVO	L	W		
CHL	TETARTH	<i>Tetraedron arthrodesmiforme</i>	(G.S. West) Woloz.	CRU	L			
CHL	TETCAUD	<i>Tetraedron caudatum</i>	(Corda) Hansg.	CRU	L			
CHL	TETCAUDL	<i>Tetraedron caudatum</i> var. <i>longispinum</i>	Lemm.	CRU	L			
CHL	TETDUOS	<i>Tetraedron duospinum</i>	Ackley	CRU	L			
CHL	TETLIMN	<i>Tetraedron limneticum</i>	Borge	CRU	L			
CHL	TETLUNU	<i>Tetraedron lunula</i>	(Reins.) Wille	CRU	L			
CHL	TETMINI	<i>Tetraedron minimum</i>	(A. Braun) Hansg.	CRU	L			
CHL	TETMIVTE	<i>Tetraedron minimum</i> var. <i>tetralobulatum</i>	Reins	CRU	L			
CHL	TETMUTI	<i>Tetraedron muticum</i>	(A. Braun) Hansg.	CRU	L			
CHL	TETREGU	<i>Tetraedron regulare</i>	Kutz.	CRU	L			
CHL	TETREGUI	<i>Tetraedron regulare</i> var. <i>incus</i>	Teil.	CRU	L			
CHL	TETTRIG	<i>Tetraedron trigonum</i>	(Nag.) Hansg.	CRU	L			
CHL	TETREGUL	<i>Tetraedron tumidulum</i>	(Reins.) Hansg.	CRU	L			
XAN	TETSMT	<i>Tetrapleton smithii</i>	(Bourr.) Bourr. (?)	OVO	L	W		
CHL	TETLACU	<i>Tetraspora lacustris</i>	Lemm.	OVO	L	W		
CHL	TETLEMM	<i>Tetraspora lemmermannii</i>	Fott	OVO	L	W		
CHL	TETSP	<i>Tetraspora</i> sp.	Link	OVO	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
CHL	TETGLAB	Tetrastrum glabrum	(Roll) Ahlstr. & Tiff.	OVO	L	W		
CHL	TETHETE	Tetrastrum heteracanthum	(Nordst.) Chod.	OVO	L	W		
CHL	TETHETEE	Tetrastrum heteracanthum f. elegans	(Playf.) Ahlstr. & Tiff.	OVO	L	W		
CHL	TETSTAU	Tetrastrum staurogeniaeformae	(Schroed.) Lemm.	CON	L	W		
			(Grunow) Ostenfeld 1901	CYL	L	W	DP	D
BAC	THABALT	Thalassiosira baltica	Hust.	CYL	L	W	DP	D
BAC	THAFLUV	Thalassiosira fluviatilis		CYL	L	W	DP	D
BAC	THASP	Thalassiosira sp.		CYL	L	W	DP	D
BAC	THAWEIS	Thalassiosira weisflogii	(Grun.) G. Fryx. & Hasle	CYL	L	W	DP	D
EUG	TRAABRU	Trachelomonas abrupta	(Swir.) Defl.	OVO	L	W		
EUG	TRAGRAN	Trachelomonas granulosa	Playf.	OVO	L	W		
EUG	TRAHISP	Trachelomonas hispida	(Perty) Stein emend. Defl.	OVO	L	W		
EUG	TRALACU	Trachelomonas lacustris	Playf.	OVO	L	W		
EUG	TRASCAB	Trachelomonas scabra	Playf.	OVO	L	W		
EUG	TRASP	Trachelomonas sp.		OVO	L	W		
EUG	TRASP1	Trachelomonas sp. # 1		OVO	L	W		
CHL	TREPLAN	Treubaria planktonica	(G.M. Sm.) Kor.	OVO	L	W		
CHL	TREQUAD	Treubaria quadrispina	(G.M. Sm.) Fott & Kovac.	OVO	L	W		
CHL	TRESCHM	Treubaria schmidlei	(Schrod.) Fott & Kovac.	CON	L	W		
CHL	TRESETIA	Treubaria setigera	(Arch.) G.M. Sm.	CON	L	W		
CHL	TRESETIU	Treubaria setigerum	(Arch.) G.M. Sm.	CON	L	W		
CHL	TRESP	Treubaria sp.		CON	L	W		
CHL	TRETRIA	Treubaria triappendiculata	Bern.	CON	L	W		
CHL	TROSP	Trochiscia sp.		OVO	L	W		
CHL	ULOSP	Ulothrix sp.		CYL	L	W	DP	D
BAC	UNICENT	Unidentified Centrales		CYL	L	W	DP	D
CHR	UNCFLAG1	Unidentified chrysophyte flagellate#1		OVO	L	W		
CHR	UNCFLAG2	Unidentified chrysophyte flagellate#2		OVO	L	W		
CHR	UNCFLAG3	Unidentified chrysophyte flagellate#3		OVO	L	W		
CHR	UNCFLAG4	Unidentified chrysophyte flagellate#4		OVO	L	W		
UNI	UNICOCCC	Unidentified coccoid colorless		OVO	L	W		
UNI	UNICOCL	Unidentified coccoid colorless (Chlorophyta)		OVO	L	W		
CYA	UNICOCCY	Unidentified coccoid cyanophyta		OVO	L	W		
UNI	UNICOCCR	Unidentified coccoid ovoid (Chrysophyta)		OVO	L	W		
UNI	UNICOCCS	Unidentified coccoid spherical		SPH				D
XAN	UNICOCX	Unidentified coccoid xanthophyte		OVO	L	W		
CHL	UNICGR	Unidentified Colonial greens		OVO	L	W		
CHR	UNICOLOF	Unidentified colorless flagellate ovoid		OVO	L	W		
CHL	UNIFILA	Unidentified filamentous green		CYL	L	W	DP	D
UNI	UNIFLAG1	Unidentified flagellate #1		OVO	L	W		
UNI	UNIFLAG2	Unidentified flagellate #2		OVO	L	W		
UNI	UNIFLAG3	Unidentified flagellate #3		OVO	L	W		
UNI	UNIFLAG4	Unidentified flagellate #4		OVO	L	W		
UNI	UNIFLAG5	Unidentified flagellate #5		OVO	L	W		
UNI	UNIFLAGW	Unidentified flagellate (with spines)		OVO	L	W		
UNI	UNIFLAGC	Unidentified flagellate colorless colonial		OVO	L	W		
UNI	UNIFLAGO	Unidentified flagellate ovoid		OVO	L	W		
UNI	UNIFLAGF	Unidentified flagellates fusiform		FUS	L	W		
UNI	UNIHEAR	Unidentified heartshaped		OVO	L	W		

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DIVISION	SPECCODE	COMBO	AUTHORITY	NEWSHAPE	L	W	DP	D
UNI	UNILORIP	Unidentified loricate sp.		OVO	L	W		
UNI	UNILORIH	Unidentified loricate sphere		SPH				D
CYA	UNIMONIC	Unidentified moniliform coccoid		OVO	L	W		
BAP	UNIPENN	Unidentified Pennales		DMB	L	W	DP	
CHR	UROLIND	Uroglena lindii	Bourr.	OVO	L	W		
CHR	UROSP	Uroglena sp.		OVO	L	W		
CHR	UROVOLV	Uroglena volvox	Ehr.	OVO	L	W		
CHM	VACSP	Vacularia sp.		OVO	L	W		
CHL	WESSP	Westella sp.		OVO	L	W		
CHL	XANCONC	Xanthidium concinnum	Arch. (?)	STR	L	W		

### Appendix 3: Formulas for Calculating Biomass for Various Phytoplankton Shapes

**“ARC”**

$$(3.1416 * \text{width}^2 * \text{length}) / 12$$

**“BUT”**

$$((4 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length} / 2))$$

**“CER”**

$$(4 * (1 / 3) * 3.1416 * (\text{diam} / 2)^2 * (\text{length})) + (3.1416 * (\text{width} / 2)^2 * (\text{depth}))$$

**“CLA”**

$$((1 / 3) * 3.1416 * (\text{length}) * (\text{width} / 2)^2)$$

**“CLB”**

$$(3.1416 * (\text{length} / 2) * (\text{width} / 2) * (\text{depth}))$$

**“CON”**

$$((1 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length}))$$

**“CRU”**

$$(\text{length}^3) / 4$$

**“CYB”**

$$(\text{width} * \text{depth} * (\text{length} / 2))$$

**“CYL”**

$$(3.1416 * (\text{width} / 2)^2 * (\text{length}))$$

$$(3.1416 * (\text{diam} / 2)^2 * (\text{depth}))$$

**“CYM”**

$$(3.1416 * (\text{width} / 2)^2 * (\text{length})) / 2$$

**“DBL”**

$$((8 / 3) * 3.1416 * (\text{length} / 2) * (\text{width} / 2) * (\text{depth} / 2))$$

**“DBB”**

$$((8 / 3) * 3.1416 * (\text{length} / 2) * (\text{width} / 2) * (\text{depth} / 2))$$

**“DMB”**

$$(\text{width} * \text{depth} * (\text{length} / 2))$$

**“FUS”**

$$((2 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length} / 2))$$

**“LEN”**

$$((2 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length} / 2))$$

**“LUN”**

$$((2 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length}))$$

**“OVB”**

$$(3.1416 * (\text{length} / 2) * (\text{width} / 2) * (\text{depth}))$$

**“OVO”**

$$(4 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length} / 2)$$

$$((4 / 3) * 3.1416 * (\text{diam} / 2)^3)$$

**“PYR”**

$$((1 / 3) * 3.1416 * (\text{width} / 2)^2 * (\text{length}))$$

**“RNF”**

$$(3.1416 * (\text{width} / 2)^2 * (\text{length}))$$

“ROD”

$$(3.1416 * (\text{width} / 2) ^ 2 * (\text{length}))$$

“RTB”

$$(\text{length} * \text{width} * \text{depth})$$

“SGB”

$$(\text{length} * \text{width} * \text{depth})$$

“SPH”

$$((4 / 3) * 3.1416 * (\text{width} / 2) ^ 2 * (\text{length} / 2))$$

$$(4 / 3) * 3.1416 * (\text{diam} / 2) ^ 3$$

“STR”

$$6 * ((1 / 3) * 3.1416 * (\text{width} / 2) ^ 2 * \text{length})$$

“TFG”

$$(3.1416 * (\text{width} / 2) ^ 2 * \text{depth}) + (2 * (\text{diam} * \text{length} * \text{width}))$$

“TRP”

$$(3.1416 * \text{width} ^ 2 * ((\text{length} + \text{width}) / 2)) / 12$$